



COCIR GUIDELINES ON ENERGY SAVING ON CT

CONTRIBUTION TO HEALTHCARE ENVIRONMENTAL SUSTAINABILITY

JANUARY 2014

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.

Computed tomography use 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).

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.

COMPUTED TOMOGRAPHY (CT)

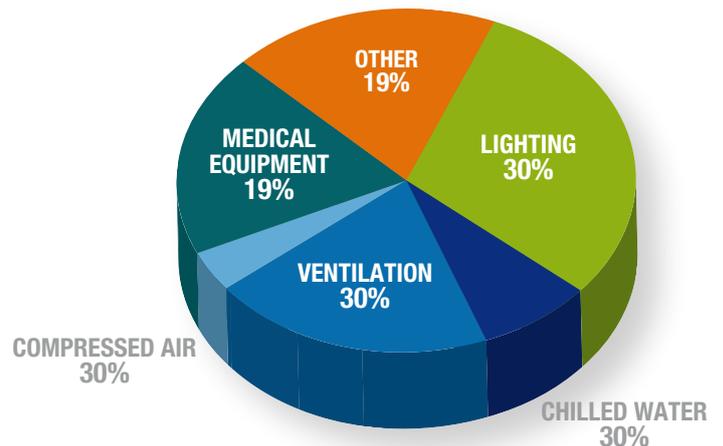
Computed tomography is a widespread medical imaging technique that utilises computer-processed X-rays to produce tomographic images or 'slices' of specific areas of the body. X-ray slice data is generated using an X-ray source that rotates around the area to be studied.

HOW TO SAVE ENERGY THROUGH PROPER USE

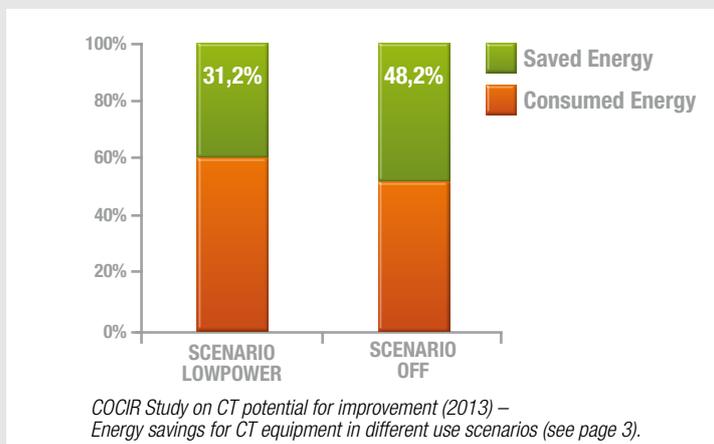
COCIR strongly believes that the greatest gains can be realised when industry, regulators and healthcare providers partner to optimise the use of technology.

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.



*Typical distribution of electricity consumption in hospitals
The Danish Energy Saving Trust "Energy efficiency in hospitals and laboratories"*



COCIR Study on CT potential for improvement (2013) – Energy savings for CT equipment in different use scenarios (see page 3).

COMPUTED TOMOGRAPHY ENVIRONMENTAL GOOD PRACTICE: SAVING ENERGY

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 (left) 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.

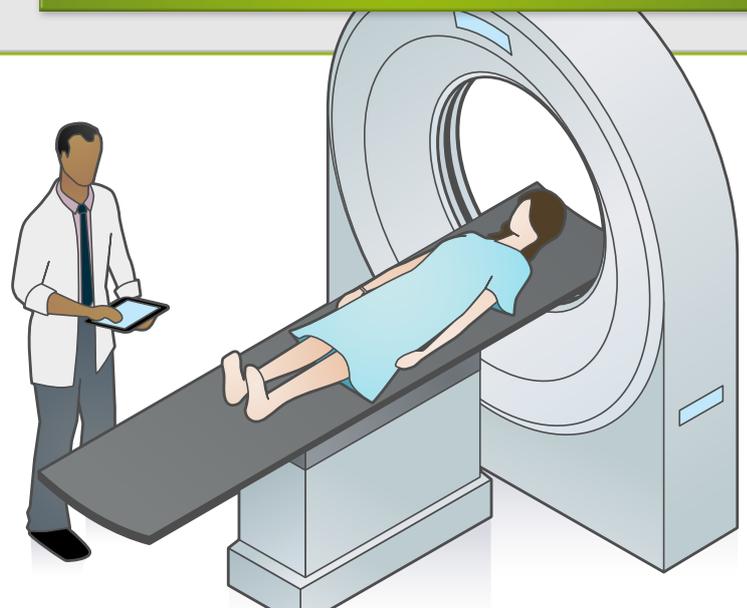
ON AVERAGE, THE ESTIMATED ENERGY SAVINGS ARE AS MUCH AS 8.8 MWH PER YEAR IN THE SCENARIO-OFF

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.





COCIR RECOMMENDATIONS FOR CT USERS

DURING PURCHASE EVALUATION

Ask for energy consumption data according to typical use scenarios and standardised methodologies.

Choose equipment with energy documentation according to the latest version of the COCIR established measurement methodology.

Verify the availability of information on the good environmental use of the equipment to maximise energy savings.

Seek equipment **with low-power features**.

Ask the manufacturer to provide technical advice on proper settings to reduce energy consumption.

DURING SETUP AND USE

Train staff on the use of low-power features, benefits and energy savings.

Switch the system off or activate low-power modes during off hours, when system is not in use, considering possible clinical limitations.

Regularly consult with the manufacturer to ensure the CT scanner is configured for optimal performance and minimum energy consumption according to real-use scenarios.

Ensure proper maintenance is performed by qualified personnel to maintain clinical and environmental performance over time.

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.



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%

MODE	HOURS IN MODE PER DAY	AVERAGE CONTRIBUTION TO ENERGY USAGE
LOW POWER	12	25%
IDLE	10,8	62%
SCAN	1,2	13%
TOTAL	24	100%

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.

Using a single mode to calculate energy consumption does not represent the real use of the equipment.

COCIR member companies defined three different Use Case Scenarios for the measurement of the daily energy consumption of CT systems: Scenario-Off, Scenario-LowPower and Scenario-Idle according to the mode the scanner is switched to during a 12-hour night time period.

USE CASE SCENARIOS	DEFINITION	
	DURING A 12-HOUR NIGHT TIME PERIOD	DURING A 12-HOUR DAY TIME PERIOD
SCENARIO-OFF	The system is shut down to Off mode according to the user manual. In Off mode the system consumes no energy.	System on, 20 Abdomen Routine scans
SCENARIO-LOWPOWER	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.	System on, 20 Abdomen Routine scans
SCENARIO-IDLE	The system works in Idle mode. The Idle mode represents a ready-to-scan state of the system	System on, 20 Abdomen Routine scans

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.

TYPICAL ENERGY CONSUMPTION

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

MODEL			
USE CASE SCENARIO*	ENERGY PER DAY	UNITS	DEVIATION, JUSTIFICATION
SCENARIO-OFF	XXX	kWh/d	
SCENARIO-LOWPOWER	YYY	kWh/d	
SCENARIO-IDLE	ZZZ	kWh/d	

* 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 variations. 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.

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.

COCIR COMPANY MEMBERS:



NATIONAL TRADE ASSOCIATIONS MEMBERS:



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