

## Guidelines: Energy Efficiency

PCFC- Entity (Business Unit) Name	:	Corporate Support Centre
Department Name	:	Environment Health and Safety Department
Section Name	:	Environment Section
Document Reference Number	:	PCFC-CSC-EHS-ENV-G18
Revision Number	:	00
Revision Date	:	January 2018
Classification	:	Public

## 18.1 Introduction

This guide is to motivate PCFC clients and make them aware about energy efficiency and to reduce the consumption of the energy. It also emphasizes on the importance of energy efficiency as a management issue and provides guidance on how to motivate staff and start energy awareness and saving campaign in the areas of steam systems, compressed air systems, motors, combustion, lighting, ventilation, air conditioning, heating, refrigeration, etc.

A sustainable use of energy has direct commercial benefits and adds a competitive edge. Improvements in the way PCFC clients use energy will enhance working conditions, reduce operating costs and improve productivity and profitability as well as contribute in saving our plant and environment.

## 18.2 Background

While energy is at the heart of economic development, its excessive use is the cause of environmental concern at the local, national and global levels. United Nations Environment Program (UNEP) is actively addressing these issues through the UNEP Collaborating Center on Energy and the Environment (UCCEE).

The demand for energy, mostly met with fossil fuel (particularly oil), has increased steadily during recent years. Demand is expected to continue growing .

The energy systems developed so far to meet this demand are clearly unsustainable, as they lead directly or indirectly to health-damaging levels of air pollution, acidification of ecosystems, land and water contamination, loss of biodiversity, and global warming.

Nevertheless, there are reasons to hope that the destructive link between energy use and environmental quality can be broken. Improvements in technology, and the willingness to experiment with new economic approaches to energy pricing, are fundamentally changing energy markets and presenting new opportunities. It is increasingly true that there are no reasons why we cannot enjoy the benefits of a high level of energy services and a better environment .

Renewable energy technologies, clean and efficient use of fossil fuels, have in many ways come of age. These will give an excellent opportunity to bypass the polluting energy path.

Clearly we must eventually shift to sustainable energy systems. How soon that shift occurs depends on actions taken today. If investment is directed towards clean energy technologies, we will all enjoy economy that is more secure and much cleaner .

This guide addresses the broad issues of energy and ideas concerning practical actions that can be taken to PCFC more energy efficient. PCFC stands ready to contribute towards achieving this goal.

### 18.3 Industry – Specific Energy Efficient Technologies

Industry uses more than one-third of all the energy used. Certain industries require a large amount of energy per unit of product, and are the best candidates on which to focus energy-efficiency efforts.

Efforts to develop energy-efficient technologies are focused on the most energy-intensive industries, including the glass industry, the metal-casting industry, the petroleum industry, and the steel industry.

For more information, refer to useful websites like:

- [www.energy.gov](http://www.energy.gov)
- [www.osti.gov](http://www.osti.gov)

### 18.4 Combined Heat Power Systems

The onsite production of electricity should be particularly attractive to industries that can also make use of the waste heat. Such combined heat and power systems – also called cogeneration system – achieve higher thermal efficiencies than stand-alone power plants.

For more information, refer to useful websites like:

- [www.dpa.gov](http://www.dpa.gov)
- [www.pnl.gov](http://www.pnl.gov)

- [www.ost.gov](http://www.ost.gov)

## 18.5 Motors

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- [www.ost.gov](http://www.ost.gov)

## 18.6 Steam Systems

Nearly 50% of all the fuel burned by the manufacturers is consumed to raise steam. A typical industrial facility can realize steam savings of 20% by improving its steam system. Simple approaches to improving energy performance include insulating steam and condensate return lines, stopping any system leaks, and maintaining steam taps. Condensate return to the boiler is essential for energy efficiency.

For more information, refer to useful websites like:

- [www.ciac.lln.gov](http://www.ciac.lln.gov)
- [www.sandia.gov](http://www.sandia.gov)

## 18.7 Compressed Air Systems

Optimization of compressed air systems can provide energy-efficiency improvements of 20-50%. Compressors using variable-speed drives are saving energy, while simple measures like detecting and fixing air leaks remain all-important.

For more information, refer to useful websites like:

- [www.cdiac.esd.ornl.gov](http://www.cdiac.esd.ornl.gov)
- [www.rrede.nrel.gov](http://www.rrede.nrel.gov)

## 18.8 Combustion

Boiler and furnaces rely on advanced burners to operate cleanly and efficiently, Emissions of pollutants such as nitrous oxides (NO<sub>x</sub>) and sulfur dioxide (SO<sub>2</sub>) are always of environmental concern in combustion processes.

For more information, refer to useful websites like:

- [www.http.ile.etd.lbl.gov](http://www.http.ile.etd.lbl.gov)
- [www.ca.sandia.gov/CRF](http://www.ca.sandia.gov/CRF)

## 18.9 Sensors and Controls

All industrial systems rely on sensors and controls. Advanced sensors and control systems can allow processes to operate at their optimal conditions.

For more information, refer to useful websites like:

- [www.energy.gov](http://www.energy.gov)
- [www.dpa.gov](http://www.dpa.gov)

## 18.10 Lighting

Energy efficient lights/bulbs are commercially available. Let us use it and save energy!

For more information, refer to useful websites like:

- [www.eefd.lbl.gov](http://www.eefd.lbl.gov)
- [www.ornl.gov/hybridlighting](http://www.ornl.gov/hybridlighting)

Be energy smart. Let us adopt energy efficient machines / products!