

## Trainer Instructions: Electric Motors

From: *Energizing Cleaner Production – a Guide for Trainers, UNEP/InWEnt, 2007*

<b>Title</b>	<b>ELECTRIC MOTORS</b>
<b>Objective</b>	To obtain an understanding of electric motors, including the types of electric motors, how to assess their performance and the main areas for energy conservation.
<b>Minimum duration and approach</b>	<ul style="list-style-type: none"> <li>▪ 1 session (1.5 hours), including the quiz and workshop exercise</li> <li>▪ Recommended approach: spend up to 1 hour on the PowerPoint presentation. Because the presentation is relatively long, the quiz can be completed as a group (rather than individually) in about 10 minutes. The workshop exercise takes about 10 minutes, especially if the calculation formulae are given. Ten minutes left to go through the answers.</li> <li>▪ Presentation: 49 slides</li> <li>▪ Textbook chapter: 24 pages</li> </ul>
<b>Contents</b>	<ul style="list-style-type: none"> <li>▪ Introduction</li> <li>▪ Types of electric motors</li> <li>▪ Assessment of electric motors</li> <li>▪ Energy efficiency opportunities</li> </ul>
<b>Assessment of participants</b>	<ul style="list-style-type: none"> <li>▪ Pose questions during the presentation. Some suggested questions are included in the trainer notes underneath each slide.</li> <li>▪ Take the quiz with 10 multiple choice questions.</li> <li>▪ Carry out the workshop exercise. Ask participants the following: <p style="margin-left: 20px;"><i>A motor with a 45kW rated capacity is drawing 30 kW of power at a given point of time. Calculate the motor loading at full load if the efficiency of the motor is 90%.</i></p> <p style="margin-left: 20px;">This workshop exercise is relatively easy to complete. But if there is limited time to complete the exercise, then the formulae can be given in advance:</p> <ul style="list-style-type: none"> <li>- <math>Efficiency\ motor\ \% = (Rated\ output\ at\ full\ load \div Rated\ input\ at\ full\ load) \times 100</math></li> <li>- <math>Motor\ loading\ (\%) = (Measured\ kW \div Rated\ input\ kW) \times 100</math></li> </ul> </li> </ul>
<b>Other comments</b>	<ul style="list-style-type: none"> <li>▪ Case study options from <a href="http://www.energyefficiencyasia.org">www.energyefficiencyasia.org</a> or other sources could be included in this session as illustrations of how other companies reduce energy consumption and costs.</li> <li>▪ This is a very important session because electric motors are used widely in industry and account for a large part of electricity use. It is not possible to include all sessions in the training course, it is recommended to remove other</li> </ul>

sessions rather than the electric motors session.

- If it is not possible to go through the quiz during the session, this can be done during a workshop exercise session at the end of the training day.