

Heat pumps

1 – Introduction

- 1 Learning objectives
- 2 Introduction to the course

2 – Definition of a heat pump, its components and its working cycle

- 1 What is a heat pump?
- 2 Coefficient of performance and energy efficiency ratio
- 3 Heating
- 4 Cooling

3 – Introduction to the parameters related to environmental and financial performance

- 1 Operational Expenditure (OPEX) and Capital Expenditure (CAPEX)
- 2 Economic trends regarding economies of scale

4 – Existing heat pump technologies and their applications

- 1 Heat pump technologies
- 2 Systematic overview of different heat pump system applications
- 3 District heating and cooling systems
- 4 Heat pumps for the industrial drying and washing process
- 5 Heat pumps for the water heating process (using waste heat from a refrigeration system) and the pasteurization process
- 6 Advantages and disadvantages
- 7 Photovoltaic self-consumption in combination with residential/industrial purposes

5 – Heat pumps and their application in their climate zones

- 1 Climate zones
- 2 Seasonal Coefficient of Performance (SCOP) and Seasonal Energy Efficiency Ratio (SEER)
- 3 Heat pump application in different climate zones
- 4 Calculation for SCOP
- 5 Calculation for SCOP and SEER
- 6 Example calculation of an SCOP

6 – Refrigerant fluids

- 1 Natural and synthetic refrigerant fluids
- 2 The global warming potential (GWP) of refrigerant fluids
- 3 Recovering/recycling/environmentally friendly disposal

5 – Summary

- 1 Summary
- 2 References
- 3 Further reading

