

Education Guidance Note 10

Specification for Skills for Reducing Emissions as part of the move towards Net Zero Heating and Cooling

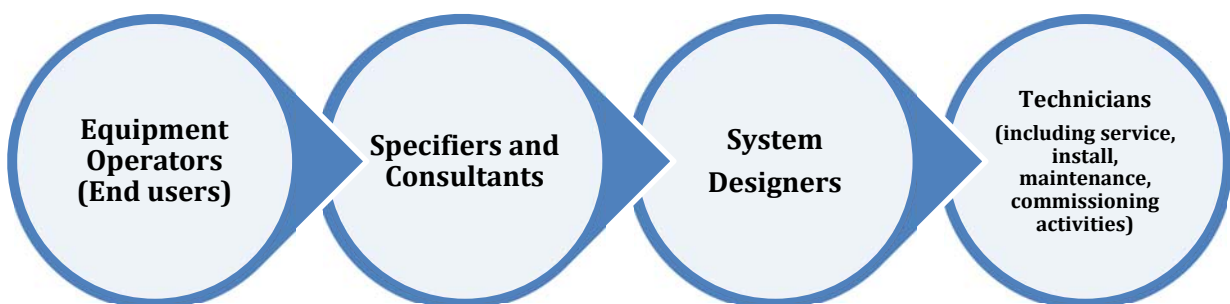
Introduction

1. This guidance note is being prepared by the Institute of Refrigeration, the professional body for the RACHP sector, affiliated to the Engineering Council. It forms part of the IOR's Beyond Refrigeration environmental work to support users of cooling and heating in working towards their net zero objectives. See www.ior.org.uk/beyondrefrigeration for more detail.
2. The purpose of this document is to describe the knowledge, skills and behaviours required to develop the best people and skills in order to make significant progress in reducing carbon emissions from heating and cooling equipment by improving efficiency and reducing direct and indirect emissions.
3. The knowledge, skills and behaviours specified below are in addition to current occupational experience or qualifications. They are not designed to replace current apprenticeship or other vocational/professional training but to supplement it, particularly for the existing workforce.
4. It is relevant to those working with any application or sector and is not equipment or technology specific.

How to use this Guidance Note

This document can be used by employers and others developing training courses as well as individuals who wish to map their planned training and development activity. As individuals move through different roles, jobs and at different times they may need to select from the different knowledge, skills and behaviour elements within in the specific Job Functions below.

The separate Job Functions covered are:



Core Elements relevant for all job functions

C1. An *awareness* of the principles of systemic approach to sustainability and circular economy (eliminate waste and pollution, circulate products and materials, regenerate nature) and with models for operating a circular economy such as:

- Ellen MacArthur Foundation Butterfly Diagram that identifies key processes and people - In the technical cycle, products are kept in circulation in the economy through reuse, repair, remanufacture and recycling. In this way, materials are kept in use and never become waste.
<https://ellenmacarthurfoundation.org/topics/circular-economy-introduction/overview>
- The RESOLVE framework (Regenerate, Share, Optimise, Loop, Virtualise, Exchange) applied to cooling processes and buildings by ARUP consulting.
<https://www.arup.com/perspectives/publications/research/section/circular-economy-in-the-built-environment>

C2 A sound understanding of the environmental impact of mechanical cooling activities in terms of both direct and indirect impacts, key factors affecting these and ways of reducing and mitigating emissions.

C3 Understands the part that their role plays in influencing and achieving the net zero heating and cooling aims of their business and their clients.

C4 Consistently works towards reducing emissions and improving efficiency and proposing sustainable solutions related to the systems and equipment they are responsible for.

C5 Communicates the needs to work towards net zero to work colleagues, teams and internal/external customers.

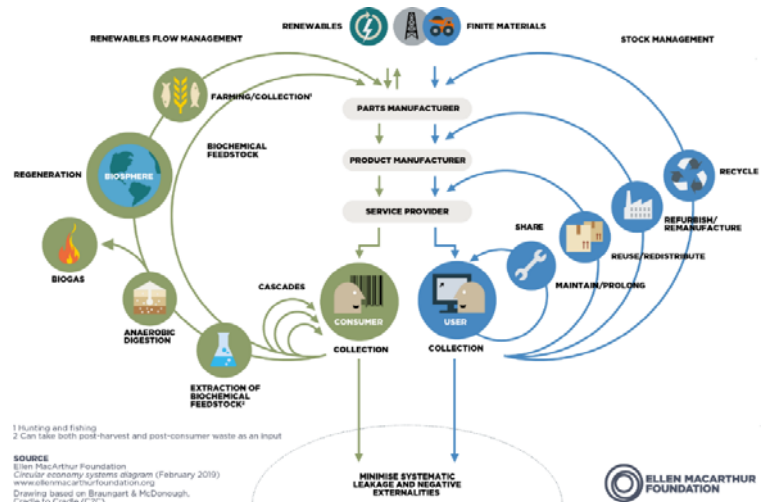


Figure 3: Adopted from: 'Growth Within: a circular economy vision for a competitive Europe', Ellen

1. For Equipment Operator / Owners

All items in Core Knowledge/Behaviours above C1-5 plus

Knowledge

K1 - Environmental Legislation, Directives, Regulation, policies and incentives such as the Energy Technology List, Climate Change Levy Agreement, BREEAM ratings etc.

K2 - The business case for low carbon solutions based on carbon impact and how to link this to business net zero objectives using values-based purchasing decisions.

K3 - How specifications and tenders can be used to achieve lowest emissions throughout the whole life of the system.

K4 - Understanding of commissioning practices to achieve best system performance and service and maintenance standards to maintain that practice.

K5 - Understands the need for data sharing, benchmarking and sharing case studies of success or achievements in reducing carbon.

K6 - Is kept aware of new technologies and practices that can assist in reducing the carbon impact of systems such as free cooling, heat networks, hydronics, passive cooling etc.

K7 - Is able to evaluate information about whole of life costing, and circular economy performance, including opportunities to eliminate waste and pollution, recycling / reuse of products and materials and safe disposal of waste and equipment at end of life if reuse is not possible.

Skills – equipment operator

S1 - Implements purchasing policies that can evaluate environmental payback and tendering processes for contractors to achieve net zero aims, including establishing minimum performance standards and design specifications.

S2 - Can measure and evaluate total cost of ownership and use this to take appropriate action.

S3 - Uses data intelligently, by interpreting energy management and monitoring data as well as system performance and maintenance records to compare actual performance against design performance and achieve improved system performance.

S4 - Manages the business energy profile to ensure heating/cooling demands are achieved using least energy possible and opportunities for combined heating and cooling and use of renewable energy sources are maximised.

S5 - Uses information to apply processes of Building Information Management where applicable.

S6 - Implements procedures and policies that support net zero objectives and takes ownership of design process and operational factors related to different design options implemented.

Behaviours

- Works collaboratively to address engineering challenges and opportunities.
- Safety approach to their work activity - ensuring safety of all persons at all times.
- Awareness of need to act in line with ethics and take personal responsibility.
- Communicates effectively at all levels.
- Flexible mindset to advancement of technology and business solutions.
- Continuous improvement to develop own skill set - actively engages in regular training updates in areas such as refrigerants, legislation, standards and committed to investment in their own skills development.
- Commitment to Professionalism – works to a high standard and managing their performance and that of the equipment they are responsible to industry expectations/published standards of behaviour.
- Willingness to share their experience and results, within corporate policy and confidentiality limitations, to assist others in addressing issues affecting current or future projects and the cooling sector eg preparing case studies, participation in research projects, involvement as government stakeholder

2. For Consultant / Applications / Sales Engineer

Nb: Consultant responsibilities will change according to individual requirements, but this provides general guidance on relevant areas

All items in Core Knowledge/Behaviours above C1-5 plus

Knowledge

K1 – Applies industry codes of practice, relevant Standards and Legislation/Regulations to achieve best practice.

K2 – Uses principles of RACHP system design to minimise direct and indirect emissions.

K3 – Sound knowledge of cooling and heating operations and how energy can be balanced including cooling and heating capacities, heat recovery and shared heating and cooling use of low-grade heat/heat networks/hydraulics, smart controls and optimisation.

K4 – Maintains awareness of new technologies and practices that can assist in reducing the carbon impact of systems such as free cooling, heat networks, hydraulics, passive cooling, thermal storage/energy storage/ Phase change materials.

K5 – Knows about opportunities and limitations of renewable energy sources.

K6 - Is able to advise customers on grants and financial incentives for low carbon technologies.

Skills

S1 – Is able to specify a range of integrated solutions to complex engineering problems to achieve low carbon sustainable solutions taking into account circular economy principles.

S2 – Calculates, measures, monitors and reports system TEWI and planned performance against energy use targets and recommends actions to further reduce carbon impact

Behaviours

- Commitment to environmental best practice and skills development CPD demonstrated by Professional Body and Engineering Council registration
- Works collaboratively to address engineering challenges and opportunities
- Safety approach to their work activity - ensuring safety of all persons at all times.
- Awareness of need to act in line with ethics and take personal responsibility.
- Communicates effectively at all levels.
- Flexible mindset to providing engineering solutions
- Continuous improvement to develop own skill set - actively engages in regular training updates in areas such as refrigerants, legislation, standards and committed to investment in their own skills development.
- Commitment to Professionalism – works to a high standard and managing their performance and that of the equipment they are responsible to industry expectations/published standards of behaviour.
- Willingness to share their experience to assist in the development of others eg supporting new entrants to the industry as a team or supervisor, raising awareness of industry or team members of technical issues encountered that might effect current or future projects and sector

3. For Design Engineers

All items in Core Knowledge/Behaviours above C1-5 plus

Knowledge

K1 –Applies industry codes of practice, relevant Standards and Legislation/Regulations to achieve best practice in design implementation.

K2 – Knows principles of RACHP system design required to minimise direct and indirect emissions.

K3 – Sound knowledge of cooling and heating operations and how energy can be balanced including cooling and heating capacities, heat recovery and shared heating and cooling, use of low-grade heat, heat networks, hydronics, smart controls and optimisation related technologies.

K4 - Is kept aware of new technologies and practices that can assist in reducing the carbon impact of systems such as free cooling, heat networks, hydronics, passive cooling, thermal storage/energy storage/ Phase change materials.

K5 - Understands the opportunities and limitations of renewable energy sources.

Skills

S1 – Is able to implement design solutions to customer/consultant specifications to meet complex engineering needs.

S2 - Can design a range of integrated solutions to complex engineering problems to achieve low carbon sustainable solutions taking into account circular economy principles.

S2 – Calculates, measures, monitors and reports system performance including energy use against design specification parameters and recommends actions to further reduce carbon impact.

S3 – Uses information to apply processes of Building Information Management where applicable.

Behaviours

- Commitment to environmental best practice and skills development CPD demonstrated by Professional Body and Engineering Council registration.
- Works collaboratively to address engineering challenges and opportunities.
- Safety approach to their work activity - ensuring safety of all persons at all times.
- Awareness of need to act in line with ethics and take personal responsibility.
- Communicates effectively at all levels.
- Flexible mindset to providing engineering solutions.
- Continuous improvement to develop own skill set - actively engages in regular training updates in areas such as refrigerants, legislation, standards and committed to investment in their own skills development.
- Commitment to Professionalism – works to a high standard and managing their performance and that of the equipment they are responsible to industry expectations/published standards of behaviour.
- Willingness to share their experience to assist in the development of others eg supporting new entrants to the industry as a team or supervisor, raising awareness of team members of technical issues encountered that might effect current or future projects and sector.

4. For those currently working in any Technician role (Service, Maintenance, Installation, Commissioning etc)

All items in Core Knowledge/Behaviours above C1-5 plus

Knowledge

K1 – Conversant with minimum requirements of environmental legal obligations eg leak checking and fixing and other F Gas Regulation requirements, efficiency reporting and the positive impact of going beyond minimum standards.

K2 – Strong understanding of system operation fundamental principles, and interpretation of data, in order to determine the cooling/heating capacity/performance and power input and determine how efficiently or otherwise a system is operating.

K3 - Sound understanding of how preventative maintenance and planned service can achieve emissions reduction.

K4 – Aware of how different efficiency measures / performance measures such as COP, EER etc can be used to measure efficiency. Knowledge of TEWI (Total Equivalent Warming Impact) calculations and total carbon impact of systems from installation through to maintenance to evaluate performance.

K5 - Keeps up to date with technology, both heating and cooling and unvented water-based systems and water regulations. A basic understanding of how low carbon technologies work and integrate.

K6 – Appreciation of the customers' net zero implementation strategies

Skills

S1 – Carries out proactive maintenance to achieve optimal system performance.

S2 – Implements best practice in refrigerant containment, recovery, recycling, reuse and disposal. Including rectifying and reporting of potential leakage and poor design issues.

S3 – Identifies and addresses underlying system issues as an essential part of any service and maintenance activity.

S4 – Is able to safely install, service and maintain low carbon technologies and is aware of requirements related to integration of technologies and connection to water, electricity, notification to authorities, use of renewables etc.

S5 - Uses technology to analyse system performance both remotely and on site and makes recommendations for improvements.

Behaviours

- Works collaboratively to address engineering challenges and opportunities.
- Safety approach to their work activity - ensuring safety of all persons at all times.
- Awareness of need to act in line with ethics and take personal responsibility.
- Communicates effectively at all levels.
- Flexible mindset to providing engineering solutions.
- Continuous improvement to develop own skill set – actively engages in regular training updates in areas such as refrigerants, legislation, standards and committed to investment in their own skills development.
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- Willingness to share their experience to assist in the development of others eg supporting new entrants to the industry as a team or supervisor, raising awareness of team members of technical issues encountered that might effect current or future projects and sector.

What do we mean by skills for net zero?

1. The IOR Beyond Refrigeration template identifies “Developing the best people and skills” as one of the critical areas to address to help the sector move towards Net Zero. Our ambition is that everyone involved has adequate technical understanding and responsibility for championing net zero.
2. The Beyond Refrigeration Policy Brief on People and Skills recommended that a long-term investment in people and skills is needed to have a long term and lasting impact on achieving net zero.
3. This document aims to set out the skills, knowledge and behaviours that underpin this.
4. The starting point is that people working in these roles already have the required competences to do their current job, this Specification sets out additional areas for potential further professional development and training.

Career development and training

1. This document forms part of the development of a series of RACHP Careers and Skills roadmaps, encouraging awareness and planned progression throughout various roles in the RACHP sector.
2. This Specification is not designed as a separate occupation or job, but to identify additional skills or continued professional development opportunities and needs.
3. Examples of Training and Certification options:
 - Modular CPD Skills with flexible delivery to fill in gaps in skills for existing workforce
 - Relevant Professional Qualifications in technical and environmental subjects
 - Inhouse training
 - Manufacturer/employer CPD certified by an independent body
 - Commitment to Planned Continued Professional Development to ensure knowledge is renewed and updated

Additional recommendations

Qualifications:

Typically Technicians (ie those carrying out Service, Maintenance, Installation and Commissioning) and Designers would be expected to have already achieved a Level 3 RACHP Apprenticeship or higher/equivalent Technical Qualification. Under the F Gas Regulation, individual refrigerant handling certification is mandatory.

Professional Registration:

Is available at EngTech, IEng and CEng level for those working in Refrigeration Air Conditioning Heat Pumps, Building Services or Energy through their nominated professional body and the Engineering Council. Registration requires a commitment to regular CPD, ethics and sustainability principles.

Competence standards:

Reference should also be made to relevant aspects of competence standards of Personnel in Refrigerating systems and heat pumps i.e. International BS EN ISO 22712 and European BS EN 13313:2010 and ISO Environmental Auditing and Performance.

For more information

- Beyond Refrigeration policy briefs and template for net zero www.ior.org.uk/beyondrefrigeration
- RACHP EngTech Specification (Level 3) <https://ior.org.uk/buy-documents?id=610&state=b>
- RACHP Design Engineer Specification <https://ior.org.uk/technical/rachp-technical?id=645&state=b>
- IOR Policy on Continued Professional Development <https://ior.org.uk/technical/rachp-technical?id=603&state=b>
- Engineering Council registration - <https://ior.org.uk/about/engineering-council-registration>
- IOR Membership – <https://ior.org.uk/membership/>

About the IOR

The Institute of Refrigeration (IOR) is an independent registered charity run for the public benefit run by a membership of over 2200 individuals reflecting the diversity of the refrigeration, air conditioning and heat pump sector. The Institute provides a central resource for experts in RACHP from all over the world to improve the application of refrigeration and allied fields for the general good of society with particular emphasis on environment, efficiency, safety and innovation. www.ior.org.uk/membership

This Education Policy paper was prepared by the IOR Education Training Policy Group as part of a series to encourage and support IOR leadership in education, training and skills. Other guidance notes available:

GN 1 – Continuing Professional Development - CPD

GN 2 - STEM (Science Technology Engineering and Maths) Learning Ambassador scheme FAQs

GN 3 - Specification for the role of Refrigeration Air Conditioning and Heat Pump Engineering Technician

GN 4 - Promoting the RACHP industry and careers through engagement with Schools, Colleges, Local Communities and Careers events

GN 5 – Specification for the role of RACHP Design and / or Applications Engineers

GN 6 - Employers Guide to Apprenticeships

GN 7 – Using IOR’s Fantastic Fridges resources to promote careers in schools

GN 8 – A Guide to Engineering Council Registration

GN 9 – Work Experience

GN 10 – Skills for Net Zero

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