

## Specification for Skills for Reducing Emissions as part of the move towards Net Zero Heating and Cooling (*draft for comment*)

### Introduction and purpose of this Guidance Note

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](http://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.
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. The specification addresses the needs of three distinct roles: equipment operators, designers and technicians.
5. It relevant to those working with any application or sector and is not equipment or technology specific.
6. This document can be used by employers and those developing training courses to map their planned training and development activity.

### Core Knowledge

C1. Understanding of the principles of systemic approach to sustainability and circular economy (eliminate waste and pollution, circulate products and materials, regenerate nature). Familiar with models for operating a circular economy including:

- 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 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.

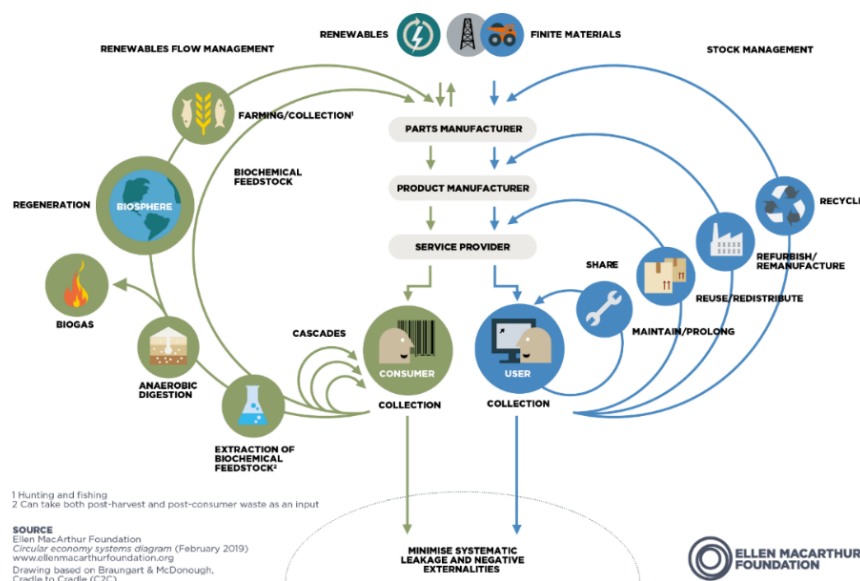
C3 Understands the part that their role plays in influencing and achieving the net zero heating and cooling aims of their business and their clients.

**Core behaviours**

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. Specification 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 cost 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, recirculating 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.
- S2 Uses data intelligently. 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.
- S3 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.
- S4 Uses information to apply processes of Building Information Management where applicable
- S5 Implements procedures and policies that support net zero objectives

## **Behaviours**

- Works collaboratively to address engineering challenges and opportunities
- Safety approach to ensure safety to persons at all times
- Ethics and Personal responsibility
- Communicates effectively at all levels
- Flexible mindset to advancement of technology and business solutions
- Continuous improvement to develop own skill set

## 2. Designer / Consultant / Applications / Sales Engineer

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

### Knowledge

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

K2 – 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 - Is kept aware 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 - Understands the opportunities and limitations of renewable energy sources

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

### Skills - designer

S1 – is able to apply 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 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 ensure safety to persons at all times

Ethics and Personal responsibility

Communicates effectively at all levels

Flexible mindset to providing engineering solutions

Continuous improvement to develop own skill set

## 3. Those currently working in any Technician / Service /Maintenance /Installation etc roles

*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, 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

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

K6 – Appreciation of the customers’ net zero implementation strategies

#### **Skills - technician**

S1 – Carries out proactive maintenance to achieve optimal system performance

S2 – Implements best practice in refrigerant containment, recovery, recycling, reuse and disposal. Including 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 ensure safety to persons at all times

Ethics and Personal responsibility

Communicates effectively at all levels

Flexible mindset to providing engineering solutions

Continuous improvement to develop own skill set

## How to use this specification

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
  - In house training
  - Manufacturer/employer CPD certified by an independent body
  - Commitment to Planned Continued Professional Development to ensure knowledge is renewed and updated.

## 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.

## Additional recommendations

### Qualifications:

Typically Technicians and Designers would be expected to have already achieved a Level 3 RACHP Apprenticeship or higher/equivalent Technical Qualification

### 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 ie 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](http://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/>

The charitable objects of the IOR are:

1. The general advancement of refrigeration in all its applications, in relation both to the perfection of its methods, and to the extension of its services to the community.
2. To promote means of communication between members and their interchange of views.
3. To encourage invention and research in all matters relating to the science and practice of refrigeration.
4. To co-operate with educational institutions for the furtherance of education in the science and practice of refrigeration.
5. To hold meetings of the IOR for reading and discussing papers dealing with refrigeration and allied subjects.
6. To publish and distribute the proceedings or reports of the IOR.
7. To do all other things, incidental or conducive to the attainment of the above objects or any of them.

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