

# Why beyond refrigeration?



## Beyond Refrigeration – an IOR template for the steps to Net Zero cooling

Climate Change is an issue that everyone in all sectors needs to address. The purpose of *Beyond Refrigeration* is to develop guidance on how we can begin to address these issues in the refrigeration, air conditioning and heat pump sectors working back from what net zero in 2050 would look like. This document is a draft – inviting reflection, comment and discussion.

**Why is this important?** If we do nothing today the cost to business is that we might not be in business by 2050. Net zero isn't just about using renewable energy – you need to make informed decisions about your future or risk being left with stranded assets – equipment you have to get rid of because it isn't compliant with government net zero policies and legislation or is costing you too much to run. A changing environment with more extremes of heat will put more demand on cooling processes. We need to reduce the climate impact of cooling activities whilst meeting the increasing demand for cooling services. All this, at the same time as improving safety, reliability and cost effectiveness. Businesses large and small, manufacturers or users of cooling need expert, independent guidance on how to address these challenges. They need to have a shared purpose and framework to work together in order to plan for their business' future based on understanding the total cost of ownership of their cooling equipment – financial and environmental.

**What does net zero mean?** Put simply, net zero refers to the balance between the amount of greenhouse gas produced and the amount removed from the atmosphere. We reach net zero when the amount we add is no more than the amount taken away. A gross-zero target would mean reducing all emissions to zero – this is not realistic, so instead the net-zero target recognises that there will be some emissions but that these need to be fully offset. The UK is the world's first major economy to set the challenging target of being a net zero economy by 2050. The RACHP sector as a major user of energy (indirect emissions) and global warming gases (direct emissions) has an important part to play in this. You can read more about UK government net zero plans from the links at the end of this document.

**How to use this template.** The IOR as a charity has the remit to support the development of technology for the public benefit. It has developed the *Beyond Refrigeration* Net Zero template to help users of cooling to plan and take action starting with the end in mind. It identifies seven key areas that they need to address and provides suggested Steps on how they can begin to work towards net zero in each of them. The Steps begin by looking at what is a good starting point today and then provide a series of graded actions to take to that will help them move along a pathway towards an ideal end goal of net zero for that area.

The template is deliberately generic and not technology specific. In this way it can be adapted for use by any company or sector to help them to plan and review their strategies for working towards achieving net zero over the next 30 years. It was developed by a range of users and designers of cooling systems and will be regularly revised and updated as an evolving dynamic strategy as we move towards our shared goals. You will need more business specific advice and guidance on how to achieve these steps and there are plenty of resources already available or being developed on a sector by sector basis – we have included a list of resources at the end and these are useful for both larger businesses wanting an industry standard comparison and smaller businesses who need help to get started. In addition Government schemes such as Climate Change Agreements, Enhanced Capital Allowances and Energy Technology Lists provide financial incentives that can support your choices.

**How to get more involved.** If you want to help this process to evolve and share steps you are taking towards net zero you can signpost additional resources and contribute to this work by signing up to our *Beyond Refrigeration* Working Groups at [www.ior.org.uk/beyondrefrigeration](http://www.ior.org.uk/beyondrefrigeration)

### The process...



<https://ior.org.uk/beyond-refrigeration>

# Programme

**2.00 – Welcome and introduction – Graeme Maidment**

**2.15 – Breakout session 1**

**2.45 – Feedback**

**3.00 – Breakout session 2**

**3.30 - Feedback**

**3.45 – Comments, conclusions and next steps...**



## The Ten Point Plan for a Green Industrial Revolution

Building back better, supporting green jobs, and accelerating our path to net zero



November 2020

# Net zero by 2050?

- Should this be delivered by policy or action on the ground?
- What will be our role?
- Focusing our activities in heating and cooling through **Beyond Refrigeration Template**
- Opportunities to be involved in leading our sector

### Balancing Heating and Cooling Demand

Heating and cooling systems have until now been specified and supplied as separate services. By integrating heating and cooling into one system, energy use could be reduced by half. The opportunities for sharing heating and cooling are not limited to one owner or site – there is vast potential for heating to be shared across site owners, buildings, and processes.

### Using Energy Intelligently

To achieve net zero, we need to address the issues of where our energy comes from and how we use it. Our homes and businesses need renewable energy that is both reliable and cheap. The grid needs to be able to supply and store energy generated by intermittent renewables sources such as wind and solar to use when there is most demand.

### Making use of Best Available Technology

In a rapidly developing and innovating marketplace purchasers and specifiers need reliable and authoritative guidance on what new technologies are available, as well as where and how they can be used. We need to share expert experience and knowledge to ensure technologies live up to expectations.

### Reducing the Need for Mechanical Cooling

Alternatives to cooling need to be considered as a first step – passive cooling, natural ventilation – all have a critical part to play in reducing carbon emissions from cooling processes. Low Tech solutions that can avoid the use of energy also need to be made more widely available.

### Achieving Best System Performance

System performance in operation – not just component rating – is the critical factor for achieving high efficiency and should be incentivised. The focus needs to be on monitoring, measuring, and maintaining system efficiency over the life of the system – as well as flexibility to adjust to changing demands.

### Developing the Best People and Skills

Lack of skilled personnel is not just a barrier to the take up of new technology but to the effective implementation of all technologies. The UK suffers from a lack of skilled engineers and experienced RACHP technicians. A long-term industry-driven strategy is needed to recruit, upskill and invest in the future of people in our sector.

### Working Together

Understanding of the challenges for our sector raised by net zero cooling is low. Lack of clear communications to ensure consumers make the best purchasing decision and lack of knowledge of specifiers are contributing factors. As experts we have a duty to work together across sectors, job roles and with policy makers to get our message across more clearly.

# A key output – Template for the steps to Net Zero

## Beyond Refrigeration – an IOR template for the steps to Net Zero cooling



Climate Change is an issue that everyone in all sectors needs to address. The purpose of *Beyond Refrigeration* is to develop guidance on how we can begin to address these issues in the refrigeration, air conditioning and heat pump sectors working back from what net zero in 2050 would look like. This document is a draft – inviting reflection, comment and discussion.

**Why is this important?** If we do nothing today the cost to business is that we might not be in business by 2050. Net zero isn't just about using renewable energy – you need to make informed decisions about your future or risk being left with stranded assets – equipment you have to get rid of because it isn't compliant with government net zero policies and legislation or is costing you too much to run. A changing environment with more extremes of heat will put more demand on cooling processes. We need to reduce the climate impact of cooling activities whilst meeting the increasing demand for cooling services. All this, at the same time as improving safety, reliability and cost effectiveness. Businesses large and small, manufacturers or users of cooling need expert, independent guidance on how to address these challenges. They need to have a shared purpose and framework to work together in order to plan for their business' future based on understanding the total cost of ownership of their cooling equipment – financial and environmental.

**What does net zero mean?** Put simply, net zero refers to the balance between the amount of greenhouse gas produced and the amount removed from the atmosphere. We reach net zero when the amount we add is no more than the amount taken away. A gross-zero target would mean reducing all emissions to zero - this is not realistic, so instead the net-zero target recognises that there will be some emissions but that these need to be fully offset. The UK is the world's first major economy to set the challenging target of being a net zero economy by 2050. The RACHP sector as a major user of energy (indirect emissions) and global warming gases (direct emissions) has an important part to play in this. You can read more about UK government net zero plans from the links at the end of this document.

**How to use this template.** The IOR as a charity has the remit to support the development of technology for the public benefit. It has developed the *Beyond Refrigeration Net Zero* template to help users of cooling to plan and take action starting with the end in mind. It identifies seven key areas that they need to address and provides suggested Steps on how they can begin to work towards net zero in each of them. The Steps begin by looking at what is a good starting point today and then provide a series of graded actions to take to that will help them move along a pathway towards an ideal end goal of net zero for that area.

The template is deliberately generic and not technology specific. In this way it can be adapted for use by any company or sector to help them to plan and review their strategies for working towards achieving net zero over the next 30 years. It was developed by a range of users and designers of cooling systems and will be regularly revised and updated as an evolving dynamic strategy as we move towards our shared goals. You will need more business specific advice and guidance on how to achieve these steps and there are plenty of resources already available or being developed on a sector by sector basis – we have included a list of resources at the end and these are useful for both larger businesses wanting an industry-standard comparison and smaller businesses who need help to get started. In addition Government schemes such as Climate Change Agreements, Enhanced Capital Allowances and Energy Technology Lists provide financial incentives that can support your choices.

**How to get more involved.** If you want to help this process to evolve and share steps you are taking towards net zero you can signpost additional resources and contribute to this work by signing up to our *Beyond Refrigeration Working Groups* at [www.ior.org.uk/beyondrefrigeration](http://www.ior.org.uk/beyondrefrigeration)

The process...



Identify collectively what we need to do to get to net zero....

A Template for end users/ RACHP companies to identify where they are now and how to get to net zero.....

- Focussed on our 7/ 8 priority areas
- Not about technology

Key steps

- Awareness
- Understanding impact
- Investigating opportunities
- Mapping the opportunities
- Implementing

<https://ior.org.uk/beyond-refrigeration>

# Net zero - Beyond Refrigeration Template for Success

## 1. Reducing the Need for Mechanical Cooling and Heating

2050 – What is our ambition? Mechanical refrigeration technology as a last resort and widespread adoption of net zero alternatives

<p><b>Starting point – Where you are now?</b></p>	<p>The starting point for a net zero strategy is minimizing mechanical cooling and heating demand requirements.          Knowledge of simple techniques to reduce cooling demand/load and their effectiveness          Knowing who to ask for specialist advice on how to reduce cooling demand.</p>
<p><b>Step 1 - What are the generic issues?</b></p>	<p>Cooling needs review and procurement strategies start with the need for the business to reduce demand.          Identifying quick and easy wins for your business such as efficiency, reducing the connected load.          Building in flexibility to respond to changing customer demand patterns and opportunities.          Measuring, monitoring and reviewing processes in place.</p>
<p><b>Step 2 - What is the incentive? How do we make it simple?</b></p>	<p>Total business net zero ROI and return on environmental impact approach to documenting and measuring changing cooling needs          Implementing long term investment to address larger system-based energy demands          Sharing business case approaches for measures to reduce demand.</p>
<p><b>Step 3 - What do we need to consider to get there?</b></p>	<p>Demand reduction as an industry standard for designers, consultants and purchasers.          Reporting measured reductions in cooling demands (benchmarking data)          Dynamic systems approach as part of intelligent energy system management to address increasing cooling demands.</p>

## 2. Achieving Best System Performance

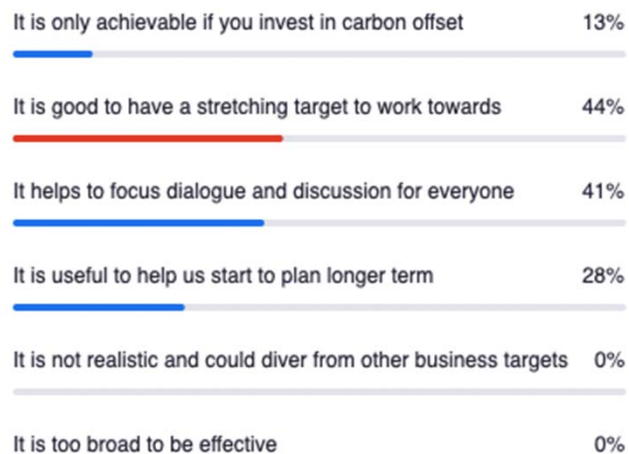
2050 – What is our ambition? Public benefit achieved by reduced energy use and increased reliability - Highest temperature possible of cooling, lowest of heating achieved.

<p><b>Starting point – Where you are now?</b></p>	<p>Designing for efficiency as a key objective including reliability, safety, skills and reuse/ remanufacture or recycle of system and components regardless of choice of refrigerant.          Commitment to system-based approaches to cooling          Appreciation of the need for measuring, monitoring and benchmarking.</p>
<p><b>Step 1 – Best practice - What needs to change?</b></p>	<p>Best practice standards in installation, (re)commissioning, service and maintenance regimes to ensure safe, reliable, efficient operation throughout the life of the system selected.          Adoption of best management processes e.g. auditing, reviewing, reporting, data schedules and priorities          Adoption of best monitoring and control strategies to maximise efficient operation.</p>
<p><b>Step 2 – Where does the whole sector need to be?</b></p>	<p>Sharing of results of real system efficiency improvements achieved.          Sharing of tools to enable evaluation of performance over time.          Technology hubs that share best solutions.</p>

# Feedback thus far

- Broad support from industry sectors
- IOR Technical Committee review
- Wider consultations at the IOR Conference
- Endorsement and sign up to action

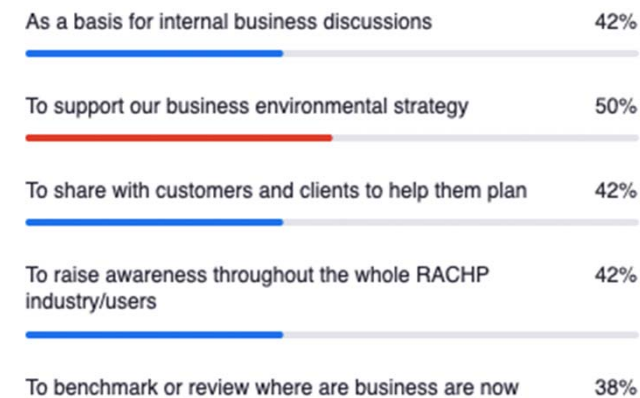
## 1. What is your reaction to Net Zero by 2050 as an ambition for the RACHP sector?(Multiple Choice)



## 1. How can we make this initiative more visible and effective through company involvement? Invite companies to...



## 1. How do you think or the businesses you work with could use the IOR Beyond Zero template?(Multiple Choice)



## Your role as an IOR member

- IOR members have the expertise, practical experience, and professionalism to make to the policy debate on how the UK can achieve low carbon heating and cooling.
- They are responsible for providing the solutions to practical cooling and heating needs - and for making sure that theoretical solutions work in practice and in the long term.
- 
- The industry needs well-informed policy to support the adoption of the best technical solutions for the future

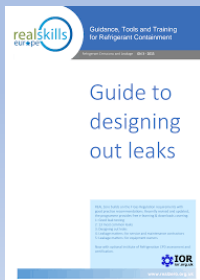


# RealZERO 2009 – 2021 and beyond

- Awareness of HFC leakage rates
- But limited focus



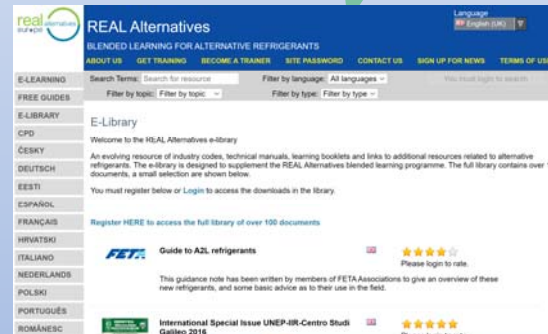
2009



2012



2018-21



- All refrigerants
- 15 Languages worldwide
- Train the trainer
- E-learning
- CPD
- Case studies & papers proved it works!
- High profile endorsement
- Tools & equipment
- Sector policy change



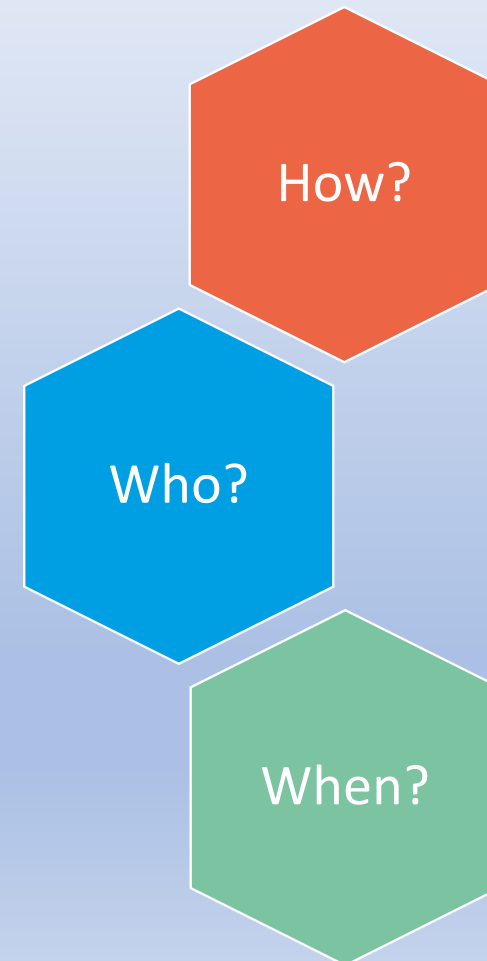
# What could the IOR could do?

- Awareness raising campaigns
- Co-ordination of industry action
- Liaison with other initiatives and groups
- Shared resources
- Signposting useful tools
- Case studies
- Guidance notes
- Conferences



# What's the outcome of the breakout groups?

- **3 activities that each group could take forward**
- **A plan/ commitment to take activities forward and report back.**



# Breakout 1 - 30 mins – report back



Theme	2050 – What is our ambition?
<b>Reducing the Need for Mechanical Cooling and Heating</b>	Mechanical refrigeration technology as a last resort and widespread adoption of net zero alternatives
<b>Achieving Best System Performance</b>	Public benefit achieved by reduced energy use and increased reliability - Highest temperature possible of cooling, lowest of heating achieved.
<b>Balancing heating and cooling</b>	Maximum heat recovery, sharing and storage in achieved across all business activities using cooling
<b>Making use of Best Available Technology</b>	Best available, closest to net zero heating and cooling as dominant technologies in use

# Breakout 2 – 30mins – report back



Theme	2050 – What is our ambition?
<b>Using Energy Intelligently</b>	Aiming towards 100% renewable energy and zero carbon energy systems providing maximised efficiency, flexibility and support grid stability
<b>Developing the Best people and skills</b>	Everyone involved in cooling and heating systems to have adequate technical understanding and responsibility for championing net zero
<b>Working Together</b>	Systemic approach to collaboration across Beyond Refrigeration themes with all relevant stakeholders with a robust framework in place for effective policy and decision making, involving Government, industry and other experts.
<b>Whole System Sustainability and more..</b>	What broader environmental matters need to be addressed? Sector specific issues? Legislation, policy? Sustainability – LCA, circular economy etc?

# Conclusion and next steps



- **Launch July**
- **But ongoing development**
- **Monthly zoom groups**
- **Report back on progress on our actions**
- **Who else to get involved – UNEP/ Cool Coalition, IIR anyone else?**
- **Anything else?**



1-3 JULY 2020 | #LCAW2020

“ Sustainable cooling underpins our mission to promote sustainable development around the world. ”



**RT HON LORD GOLDSMITH**  
INT. ENVIRONMENT MINISTER, DEFRA

01-12 NOV 2021  
GLASGOW

# GOP26

IN PARTNERSHIP WITH ITALY



The Co  
Forecast  
cooling demand



## A COOL WORLD DEFINING THE ENERGY CONUNDRUM OF COOLING FOR

Principles for  
National Cooling Plans



This brief provides high-level guiding principles for countries to draw on when considering their development of National Cooling Plans (also known as Cooling Action Plans, or roadmaps). It draws on K-CEP's work in over 25 countries on developing National Cooling Plans.

**K-CEP'S WORK ON NATIONAL COOLING PLANS**

National cooling plans (NCPs) and roadmaps are a key part of K-CEP's work in its Institutional Strengthening for Efficiency window. We are working with over 25 countries on developing NCPs or roadmaps, which integrate consideration of HCFC phase-out and HFC phasedown, energy efficiency and access to cooling. While work is ongoing in developing NCPs in countries supported by K-CEP, India has led the way with the first draft Cooling Action Plan published (draft for review in October 2018). K-CEP will share lessons in due course as we gain experience from our projects, and welcomes the opportunity to support and facilitate knowledge sharing between countries.

- management plans (HPMPs) and future HFC phase-down plans with a view to identifying actions to promote benefits of improved energy efficiency alongside the F-gas transition.
- Closer coordination between the Montreal Protocol F-gas phase-down timeline, and the five yearly Nationally Determined Contribution (NDC) ratcheting timescale of the UNFCCC. NDCs drive energy efficiency requirements and harmonization would allow businesses and consumers to make better investment and purchasing choices.
- Longer term plans are preferable, and should include a mix of short term implementation plans as well as

### Cooling in a warming world

Count on Cooling:  
A five-step approach  
to deliver sustainable cooling



A white paper prepared by EPEE



Cooling needs




**Optimise**  
THE NEED FOR COOLING

**Address investment cost**  
FOR HIGHER EFFICIENCY SOLUTIONS

**Mitigate**  
THE CLIMATE IMPACT OF REFRIGERANTS

Global **Cooling**  
Prize

 UK Government

 Centre for  
Sustainable  
Cooling

 Cool  
Coalition

**UN**   
environment

**KIGALI**  
COOLING EFFICIENCY PROGRAM

 MI  
MISSION  
INNOVATION

**EPEE** 

European Partnership for Energy  
and the Environment

 CountOn  
Cooling



INTERNATIONAL INSTITUTE OF REFRIGERATION  
INSTITUT INTERNATIONAL DU FROID