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## Investment in Zero Emission Cold Chain (ZECC) Workshop Report

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# **Investment in Zero Emission Cold Chain (ZECC) Workshop Report (Market Review)**

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Heriot-Watt University

## Executive Summary

This workshop was organized as part of the Zero emission cold chain (ZECC) project, which is dedicated to understanding the opportunities, risks, and barriers associated with **investments** in low-carbon measures within the food cold chain industry. The selection of discussion topics and participatory sessions was meticulous, drawing on background research, preliminary survey results, and extensive consultations with leading cold-chain industry experts. This rigorous process was undertaken to ensure that the outcomes of the workshop align with the industry's business agenda and the objectives of the ZECC project.

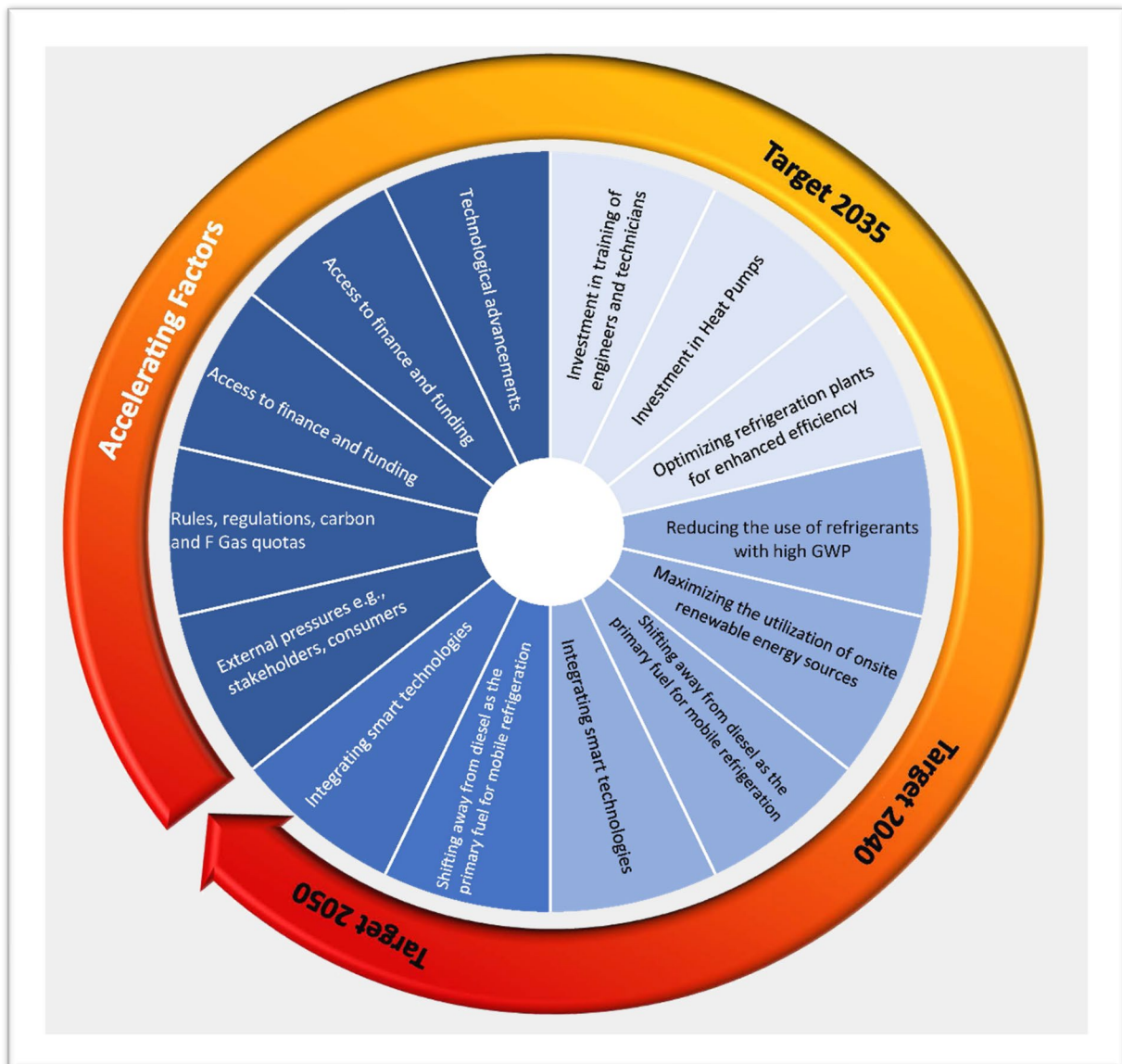
The workshop report provides a thorough exploration of the path towards achieving a net-zero cold chain, with a particular focus on the critical years 2035, 2040, and 2050. It highlights the pressing need to transition away from environmentally harmful practices, such as using high global warming potential (GWP) refrigerants and inefficient diesel technologies or reducing the usage/leakage of high GWP refrigerants. Discussions underscore the pivotal role of behaviour change within businesses and industries, driven by incentives that align with broader climate objectives.

Furthermore, the report highlights the complexity of either within company or intra company benchmarking and energy efficiency in various sectors, offering insights into the challenges and incentives businesses encounter when investing in low-carbon technologies. Clear government regulations, economic drivers, infrastructure upgrades, and workforce skills development emerged as vital factors in facilitating this transition. Ultimately, this report underscores the urgency of collaborative efforts, both within and outside the industry, and calls for government support to drive the transition toward a more sustainable and net-zero cold chain.

The workshop shed light on the multifaceted challenges and opportunities within the cold chain industry's journey towards sustainability. It recognized the importance of a gradual transition, with a focus on foundational changes in behaviour and processes as a pragmatic approach to meeting sustainability targets. The significance of government regulations, incentives, and clear rules in driving investments in low-carbon technologies was reiterated, as was the need for innovative financing options. The report underscores the crucial role of a well-trained workforce in effectively implementing new technologies and emphasizes the need for long-term planning and consistent government support to ensure a sustainable future. Collaboration among industry stakeholders emerged as a key theme, highlighting the industry's collective commitment to achieving sustainable cooling solutions.

While the focus of this workshop is on investment strategies, challenges, and motivations related to low GWP systems for decarbonizing the food and beverage cold chain, future sessions may explore investment opportunities and challenges associated with more innovative and radical measures such as online fresh supermarkets, automated delivery and energy storage.

# 1. Participatory Session



The graph above illustrates investment opportunities in the low-carbon food chain and their corresponding acceleration factors. The main focus of this graph is on available technologies, while more innovative and radical low-carbon technologies, such as deploying energy storage, online fresh supermarkets, automated delivery systems, cryogenic refrigerated trucks, and the use of phase change materials (PCMs), should be discussed further in future reports.

### **Question 1: What key investment opportunities are anticipated to achieve net-zero cold chain for the periods 2035, 2040, and 2050?**

For the target year 2035, the most favoured investment opportunities include *optimizing refrigeration plants for enhanced efficiency, reducing the use of refrigerants with high global warming potential (GWP) by switching to low/zero GWP alternatives or decreasing the usage/leakage of these refrigerants, maximizing the utilization of onsite renewable energy sources, and transitioning away from diesel as the primary fuel for mobile refrigeration*. Investment in training of engineers and technicians in designing and maintaining efficient equipment also received significant support, as did *heat pump technologies driven by renewables* and the use of *heat recovery from refrigeration*. Additionally, factors like *motivating users and considering energy efficiency* as a major driver were mentioned.

In the period spanning from 2035 to 2040, there is a continued emphasis on *reducing the use of high-GWP refrigerants, leveraging renewable energy sources, and adopting smart technologies*. It was noted that *economic conditions* would play a role in decision-making during this timeframe, and the shift to low carbon fuels is expected to become more common. Looking ahead to 2040-2050, *maximizing onsite renewable energy sources, reducing reliance on diesel for mobile refrigeration, and integrating smart technologies* are considered key investment opportunities.

### **Question 2: What are the primary factors influencing investments in low-carbon activities and technologies, particularly in the context of the year 2050?**

Various factors were pinpointed as influential drivers of investments in low-carbon activities and technologies for the year 2050. These include *high carbon and refrigerant costs, external pressures originating from consumers and other stakeholders, regulations and quotas* related to carbon emissions and refrigerants, *ongoing technological advancements, access to finance and funding, and regulatory compliance*. Additionally, cost of energy and growing customer demand for sustainability were also identified as significant factors, though it was noted that achieving a reasonable payback time may require government support. Some respondents highlighted the *challenge of public understanding* and political handling of pollution as separate issues, indicating the complexity of navigating these multifaceted considerations.

### **Question 3: At what point do cold chain industries typically initiate the exploration of investments in sustainable technologies, and to what extent? What are the pivotal factors that promote concrete commitments to such investments?**

The responses indicated that within cold chain industries, the pursuit of sustainable technologies typically commences towards the *end of equipment life cycles* or in

response to *government regulations* enforce limitations. *Profitability, operational efficiency, and cost savings* emerge as significant motivators for investment decisions. Other factors include market competitiveness, corporate social responsibility goals, the availability of grants and incentives, customer pressure, and reliability issues with existing equipment.

#### Question 4: What needs to change in the current system to accelerate the net-zero cold chain?

To accelerate the transition to a net-zero cold chain, respondents highlighted the need for financial drivers that support decarbonization, such as aligning fuel prices with carbon intensity. Establishing benchmarking processes, setting performance criteria, and implementing minimum energy performance standards for cold chain applications, were considered important measures. Furthermore, effective monitoring, reporting, and regulatory support were also identified as key factors. Strategies such as phasing out gas for heating, government regulations and guidelines, funding, incentives for NetZero technology improvements, and knowledge sharing and collaboration across the industry were emphasized. Aspects of this acceleration process also include promoting behavioural changes, optimising cold chain usage when not needed, and building trust through transparent and meaningful information dissemination.

## 2. Panel Discussion

The discussion began by focusing on *investment opportunities and targets* related to energy efficiency and sustainability in the context of 2035, 2040, and 2050. There was a strong emphasis on the need to transition away from environmentally harmful practices, such as using high GWP refrigerants and inefficient diesel technologies or alternatively reducing the usage/leakage of high GWP refrigerants. Participants highlighted the importance of addressing energy efficiency as a foundational step in combating climate change. The discussion also stressed that while there is a growing interest in advanced technologies, it's essential not to overlook the basics, like optimizing processes and behaviours within various industries.

The panel acknowledged that *behaviour change* is crucial to achieving sustainability goals. To instil these changes within businesses, a combination of top-down and bottom-up approaches was suggested. Incentives, including financial rewards and the alignment of individual actions with broader climate goals, were seen as effective motivators for encouraging employees to adopt more sustainable practices. Overall, the discussion emphasized the need to start with fundamental changes in behaviour and processes as a pragmatic approach to achieving sustainability targets in the near future, while also considering the complexities of incentivizing change across different levels of an organization.

Then the conversation delved into the *challenges of implementing behaviour change and benchmarking in energy efficiency efforts*. It was emphasized that

recognizing and altering behaviour is a gradual process, with reinforcement over months being more effective than quick fixes. Benchmarking, while valuable, was seen as a complex task, especially in industries like food processing, where various factors affect energy efficiency. The need for either within company or intra company benchmarking to demonstrate the impact of energy-saving measures on businesses was highlighted. Regular and progressive benchmarking helps companies understand their performance relative to their peers and motivates them to improve.

The discussion also touched on the ***slow adoption of energy-efficient practices***, with some businesses still lagging in understanding and implementing sustainable measures. The panel acknowledged that businesses often resist change due to perceived risks and uncertainties, including the impact on their cash reserves and the challenges posed by factors like Brexit and the pandemic.

Additionally, ***transitioning from gas to electrification*** in industries such as cooking was seen as challenging, as businesses are hesitant to change established processes that yield specific quality outcomes. Overall, the panel emphasized the importance of gradually instilling behaviour change, benchmarking, and addressing industry-specific challenges to drive energy efficiency and sustainability efforts effectively.

The ***challenges and incentives for businesses to invest*** in low-carbon technologies and energy-efficient practices were explored. It was noted that while there is a desire to transition to more sustainable options, the ***return on investment (ROI) often remains weak***, making it a difficult decision for businesses. The example of investing in heat recovery technology in bakeries was cited as a significant undertaking with a challenging ROI, but it highlighted the importance of taking bold steps toward sustainability.

The panel discussed various ***factors influencing investments***, including regulatory requirements, technological advancements, access to finance, and external pressures. It was recognized that government regulations and incentives play a crucial role in driving investments in low-carbon technologies. Additionally, the increasing ***awareness of environmental issues among younger generations*** was seen as a potential driver for change in business practices.

The conversation also touched on the need to decouple the cost of electricity from gas prices and emphasized the importance of ***clear rules and government support*** in fostering the adoption of sustainable technologies. Overall, the panel highlighted the complex interplay of factors that influence businesses' decisions to invest in energy efficiency and low-carbon solutions. The discussion emphasized the ***need for financing options and targets*** to drive the adoption of low-carbon technologies. It was noted that the industry may not have enough incentives to make significant changes unless there are economic drivers, such as taxation or carbon pricing, to encourage the reduction of carbon emissions. The importance of legislation and clear rules was also highlighted as a key driver for businesses to transition to more sustainable practices.

Acknowledging the challenges associated with upgrading infrastructure to support electrification, especially when it comes to the **grid's capacity**. There was a concern that large factories and processing facilities transitioning to electrification might overwhelm the current grid infrastructure. The discussion also touched on the need for aggressive action to meet long-term emission reduction goals, emphasizing that measures must be taken today to avoid overcontributing to emissions in the future. Overall, the panel called for clarity, commitment, and support from the government to accelerate the transition to low-carbon technologies and ensure that businesses can plan and invest accordingly.

Then, the focus shifted towards the need for **training and skills development** in the workforce to effectively implement low-carbon technologies. The panel stressed that while technology and infrastructure can be developed, it's the people with the necessary skills and training who are essential for the success of these initiatives. It was emphasized that creating a well-trained workforce is crucial to ensure that new technologies are safely and effectively implemented without causing issues that could undermine public trust in these technologies.

The discussion also touched on the importance of **long-term planning and government regulations** to support the transition to sustainable practices. There was a recognition that short-term policies and lack of consistency in government support could hinder the adoption of environmentally friendly technologies. The panel also explored the idea of innovative financing options to encourage businesses to invest in green technologies. While there were challenges, such as legal considerations, the need for financing solutions to guarantee the return on investments in low-carbon technologies was highlighted. The panel concluded that a collaborative effort is needed from both government and private sectors to drive the transition towards a more sustainable future.

Finally, the importance of **clarity, collaboration, and certainty in government policies and regulations** was highlighted. The panel members expressed the need for clear and decisive government actions and regulations to drive the transition to low-carbon solutions effectively. The lack of clarity in policies and the political hesitation to set firm dates and guidelines were identified as challenges that hinder progress in the industry.

Collaboration among industry stakeholders was also emphasized as a key factor in achieving sustainable cooling solutions. The panel acknowledged that collaboration and coordination among different sectors of the industry, as well as training initiatives, can help accelerate progress towards sustainability goals. The discussion concluded with an appreciation for the insights shared and a call for more clarity and collaboration in the future.

### 3. Key Takeaways

The workshop covered several critical points related to energy efficiency, sustainability, and the challenges faced in transitioning to low-carbon technologies:

- 1. Transition to Sustainability:** The discussion emphasized the need to transition away from environmentally harmful practices, such as using high GWP refrigerants and inefficient diesel technologies. The years 2035, 2040, and 2050 were highlighted as critical targets for achieving sustainability goals.
- 2. Behaviour Change:** Behaviour change within businesses and industries was identified as crucial for achieving sustainability goals. Incentives, both financial and alignment with broader climate goals, were seen as effective motivators for encouraging employees to adopt more sustainable practices.
- 3. Benchmarking and Energy Efficiency:** Benchmarking, while valuable, was considered complex, especially in industries like food processing. The need for either within company or intra company benchmarking to demonstrate the impact of energy-saving measures and motivate businesses to improve was highlighted.
- 4. Challenges in Adoption:** Some businesses were noted to be slow in adopting energy-efficient practices due to perceived risks and uncertainties, including Brexit and the pandemic. Transitioning from gas to electrification in industries like cooking posed challenges.
- 5. Investment Challenges:** The ROI for sustainable technologies was identified as a significant hurdle for businesses. Regulatory requirements, technological advancements, access to finance, and external pressures were noted as factors influencing investments.
- 6. Government Regulations and Support:** Clear government regulations and incentives were seen as crucial drivers for businesses to transition to sustainable practices. Legislation and economic drivers, such as carbon pricing, were highlighted as important.
- 7. Infrastructure and Grid Capacity:** Upgrading infrastructure to support electrification, especially in large factories and processing facilities, was recognized as a challenge. Concerns were raised about overwhelming the current grid infrastructure.
- 8. Training and Skills Development:** The importance of training and skills development in the workforce was emphasized. Having a well-trained workforce is essential for safely and effectively implementing new technologies.
- 9. Long-Term Planning and Government Regulations:** Short-term policies and lack of consistency in government support were seen as hindrances to adopting environmentally friendly technologies. Long-term planning and consistent regulations were advocated for.

**10. Innovative Financing:** The panel discussed the need for innovative financing options to encourage businesses to invest in green technologies. Legal considerations and guarantees for ROI were challenges to overcome.

**11. Clarity and Collaboration:** Clear and decisive government actions, collaboration among industry stakeholders, and coordination among different sectors were highlighted as essential for achieving sustainability goals.

**12. Call for Government Support:** The panel called for clarity, commitment, and support from the government to accelerate the transition to low-carbon technologies and ensure that businesses can plan and invest accordingly.

## 4. Acknowledgment

The organizers extend warm gratitude to the companies and organizations whose representative names and logos appear below for their constructive collaboration in the preparation of workshop materials and their participation in the workshop:

### Panel Members

Rob Lamb (Chair)  
Iain Clunie  
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Judith Evans  
Alan Foster

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