



Meeting Review

Singapore
December 2-3, 2015

Overview

The second World Cold Chain Summit to Reduce Food Waste was held in Singapore on December 2 and 3, 2015. Sponsored by Carrier, a unit of United Technologies, the conference brought together 131 delegates from 33 nations, including food scientists, cold chain experts, government and nonprofit executives, and the press. Jon Shaw, Sustainability & Communications, Carrier Transicold & Refrigeration Systems, welcomed attendees and set the tone for the conference, saying, **“The cold chain is one of the single best investments in food preservation.”** He reviewed notes from last year’s inaugural cold chain summit in London, and referred delegates to their complimentary copies of the Carrier publication, *Food Foolish: The Hidden Connection Between Hunger, Food Waste and Climate Change*.

Opening Keynote Remarks

Jon was joined by David Appel, President, Carrier Transicold & Refrigeration Systems, who highlighted Carrier’s century-old, founding role in the air conditioning industry. “Would we even be sitting here today in this fabulous hotel if not for air conditioning?” he asked attendees. **“Now,” Appel added, “we want to play a leading role in making and achieving a quantifiable reduction in food loss and food waste.”** Appel detailed Carrier’s cold chain systems and new developments in sustainable technologies to reduce carbon emissions. **“A green cold chain becomes an essential tool to solving the larger problem of food loss and waste.”**

United Technologies’ Chief Sustainability Officer, John Mandyck, discussed the challenges of feeding

a growing planet and the impact on climate change. “UTC has a unique perspective into the world’s food supply,” Mandyck said, outlining some of the key findings in *Food Foolish*:

- We live on a hungry planet—1 in 9 people don’t get enough food every day.
- Farming is the largest human endeavor on earth, using 38% of our ice-free land.
- Just 1.3% of the water on our planet is freshwater that we can access, and we use 70% of that for agriculture.
- Despite this enormous dedication of human and natural resources, we throw away one-third to 40% of all of our food—food that never makes it from farm to fork. This totals 1.3 billion metric tons of waste annually and \$2.6 trillion in all costs. **“More than 50% of the food categories wasted are the food types that can be extended by the cold chain.”**
- The carbon footprint of food waste is 3.3 billion metric tons a year. If food waste were a country it would be the world’s third largest emitter of greenhouse gas. **“When was the last time in any climate policy debate did you hear the term ‘food waste?’” Mandyck challenged delegates.**

Then he continued, “What needs to change to address this issue? We need more refrigerated transport, more refrigerated storage, stronger food waste reduction goals. We need innovation and new technology, and consumer awareness. **The single best way we have to preserve food,” Mandyck added, “is the cold chain.”**

Mandyck then referenced the UN's Green Climate Fund, designed to engage directly with both the public and private sector in transformational climate-sensitive investments. "The Green Climate Fund—currently funded at \$10 billion and forecast to be \$100 billion by 2020—is an opportunity to unlock new resources to reduce climate change in developing countries," Mandyck said. It recently funded its first dozen projects around the world. **"The Green Climate Fund could be used to upgrade power plants and green buildings—but," Mandyck added, "why wouldn't eliminating food waste be on the list? It's the only policy that feeds people, saves water, promotes national security and reduces greenhouse gases."**

Programs and Panels

The World Cold Chain Summit continued with its Inaugural Speaker Panel, featuring three industry thought leaders. Dr. Joseph Mpagalile, Agro-Industry Officer, Food and Agriculture Organization for the United Nations, told attendees that there is an imperative to repair and improve mankind's broken food system. "About half of food loss and waste occurs in developing countries," he said. "By 2030 about 90% of people will live in developing countries. Without change, food production will need to grow 60% to 70% to feed this growing population."

"What can be done?" Mpagalile asked delegates. **"The cold chain must be introduced in developing countries in a sustainable manner," he answered. "The government and private sector must make a real commitment to this development."** Many parts of the developing world have set aggressive

goals to reduce food loss, Mpagalile reminded the audience. "Without a commitment to developing the cold chain, those goals will be very difficult to achieve."

The FAO has taken the lead role in founding a coalition to lead this initiative, with a special focus on developing countries. "Everyone in the food supply chain will benefit—farmers, postharvest handlers, processing and storage, distribution and transportation, wholesale and retailing and consumers." The proposed coalition will be rolled out with a multibillion dollar budget over three years beginning in 2016. "If we all join hands," Mpagalile concluded, "we will be able to reduce food waste."

Clementine O'Connor, Sustainable Food System Consultant, United Nations Environment Programme, introduced delegates to the UN's Sustainable Development Goals, adopted in September 2015. Goal 12¹ is aimed at ensuring sustainable consumption and production patterns, O'Connor said. **This includes a target of halving per capita global waste at retail and consumer levels and reducing food losses along the entire global food supply chain.**

UNEP is piloting an approach in South Africa to consumer food waste prevention by carefully mapping and measuring household activity. **"Often the act of measurement itself leads to a higher awareness and automatic reduction of waste," O'Connor told her audience—pointing to a 21% reduction in food waste in UK households since 2010.** "The Food Loss & Waste Protocol is a global standard for waste measurement," she added, "to be launched in January 2016. It will result in standard

¹<http://www.my.undp.org/content/malaysia/en/home/presscenter/articles/2015/08/04/sdg-goal-12-ensuring-sustainable-consumption-and-production-patterns-an-essential-requirement-for-sustainable-development.html>.

food waste data and credible, practical, transparent data to establish a 2016 baseline.” O’Connor challenged companies to lead by example.

Didier Coulomb, Director General, International Institute of Refrigeration, reminded Summit attendees that 23% of food losses are caused by lack of refrigeration in developing countries—and 9% in developed countries. **“If we could attain the same losses in developing countries as developed countries,” he said, “the global food supply only needs to grow 15% by 2050 vs. 70% forecast growth.”**

After a mid-morning break, Professor Judith Evans, London South Bank University, presented The Global Refrigeration Impact on Food Loss and Waste. “The worst thing you can do is waste food at the consumer end of the cold chain,” Evans said. “And in developing countries, this is where most of the loss occurs.” The problems are technical in nature, she said, but also behavioral. Focus can be placed on improved postharvest and cold chain operations, but Evans—like O’Connor—also believes consumers can play a huge role in food waste reduction. For example, shelf life could be improved by an entire day for many products if consumers were educated to reduce their refrigerator temperatures from an average 7C to 1C-5C. “And extending product life by one day can have profound effects on the high levels of food that’s wasted,” Evans concluded.

Olivier Jan, a Partner with Deloitte Sustainability, presented Assessing the Potential of the Cold Chain Sector to Reduce GHG Emissions Through Food Waste Reduction. Focused on perishable fresh food in developing regions of the world, the study modeled three scenarios that compared the

GHG emissions savings credited to food waste reduction against the GHG emissions created as a consequence of the new cold chain activities. “From an environmental perspective there is a clear net benefit in introducing the cold chain in developing countries,” Jan told attendees. “The decrease of the food loss and waste carbon footprint from cold chain expansion outbalances additional emissions by a factor of 10.”

“The highest net GHG ‘savings’ are likely to be found in China,” Jan said, “and on vegetable and meat supply chains.”

Day 1 Afternoon

The first afternoon panel discussion, Reducing Food Losses in Developing Countries, was chaired by Andrew Morgan, Director, Global 78 Limited.

El Houssine Bartali of the Agronomy and Veterinary Institute Hassan II in Morocco told attendees that Morocco is committed to cutting food loss in half by 2025. **Today, losses in products like apples can range from 20% to 60%. The adoption of refrigeration can reduce this from 1% to 5%.** John Ackermann of The Cold Link in South Africa described a country of vast distances, high ambient temperatures, poor regional infrastructure and a lack of cold chain skills. Important drivers to reducing food waste, he said, included a greater emphasis on postharvest technology to extend shelf life and more centralized distribution. The need to reduce food waste is especially important in South Africa, currently experiencing its most severe drought in 45 years.

Marijn Van der Laan of Fresh Dynamics in Indonesia said that traders often deny food losses, but if “pushed,” blame poor quality, packaging and the lack of a cold chain. Pornthipa Ongkunaruk of Kasetsart University in Thailand noted that transport in the country could be 10-15 hours, sometimes at outside temperatures exceeding 35C. Without a functioning cold chain, losses can be 30-50%.

Elhadi M. Yahia of Universidad Autonoma de Queretaro in Mexico noted that “Inside Mexico there are developed ‘countries,’ developing ‘countries’ and undeveloped ‘countries.’ The same is true in Latin America.” This means the nation’s cold chain ranges from modern and effective to nonexistent. Mexico is making good progress, however, Yahia said, and could be used as a model for development in Africa and other parts of the world. **“A better cold chain: less waste,” Yahia concluded. “Everywhere.”**

Likewise, Florence Syoen of Kayser in Colombia said that food loss could be 40% due to the country’s different climates and challenging geography. “Transport can range from 10 hours to 30 hours. The cold chain is not organized—so the majority of loss is during transportation,” she told attendees.

Besides climate and geography, developing economies can face complicated border crossings and the inability of smallholder farmers to organize effectively. Andrew Morgan and his panel concluded that there must be a commercial imperative to developing a cold chain—and the more links of the entire supply chain that benefit, the stronger the cold chain will be.

The final session of Day 1, Reducing Food Losses Across the Supply Chain, was chaired by Eric Schultz, former CEO of Sensitech and co-author of

Food Foolish. Schultz opened by saying that the term “cold chain,” so familiar to attendees, was often new to those outside the industry. “And,” he added, “even after explaining it to consumers, they often understand the ‘cold’ part of the definition better than the ‘chain’ part.” This is because each link of the chain is its own sophisticated and customized system that requires technology, process and people to be effective. “The presentations today will illustrate that complexity,” he said, “and the expertise required to run this ‘modern miracle.’”

Pascal Chapot of Nestlé SA in Switzerland discussed direct sourcing of fresh milk collection in Pakistan. The program includes 170,000 farmers and 3,300 chilling points spread over 110,000 square kilometers, a very complex upstream flow from farm to factory. “The cold chain is of crucial importance,” including quick chilling right after milking. Nestlé’s provides training and financial support which helps farmer to improve their production quality and reduce loss. By focusing on metrics and continuous improvement, the company reduced transit losses by 1/3 from 2010 to 2013. **The company is also greening the cold chain by developing renewable energy sources to power its chilling centers.**

Eduardo Kerbel of Carrier in Costa Rica presented a step-by-step analysis of postharvest losses of fresh produce throughout the cold chain. He emphasized that the maximum quality is determined at harvest, so that subsequent handling must be efficient and effective to preserve this initial quality. Cold chain compliance is essential; it must be an integrated process that optimizes cooling during transport. **“When it comes to offering the world good, nutritious and safe fresh produce, it is a lot cheaper and efficient to spend our**

resources on maintaining the condition, quality and wholesomeness of produce that was already harvested, rather than try to compensate for postharvest losses by producing more and more,” Kerbel said.

Erdem Sozvar of Havi Logistics in Turkey presented cold chain applications in the Turkish market, which creates 325,000 tons of food waste annually. Sozvar noted that 92% of Turkish consumers want to see reduced food waste in restaurants, and 79% are willing to pay more if the restaurants can provide valid proof of reduced food waste. Havi relies on establishing critical control points throughout the cold chain and emphasizes proper warehousing, smart route planning, and the use of solid truck boxes with strong cooling units. There are seasons when the outside temperature on a supply route can exceed 50C. **Havi has been most effective when it emphasizes extended collaboration and shared value creation along the cold chain.**

Day 2

The second day of the World Cold Chain Summit began with a session, Refrigeration Technologies to Reduce Food Losses, chaired by Gerald Cavalier of Cemafruid in France. There are 1.5 billion domestic refrigerators, 2 million refrigerated containers, and 4 million refrigerated trucks in the world, he told attendees. And developed countries have about 10 times the refrigeration capacity of developing countries—so there is tremendous opportunity to expand global coverage of refrigeration. Sustainability remains an ongoing challenge and includes energy efficiency, cost, global warming, safety issues and reducing food loss.

Important recent innovations include low GWP HFCs and new standards, Cavalier said. The industry is also focused on seeking continuity (“the right temperature everywhere at any time”), connecting refrigeration with Big Data, improving services, enhancing training, improving environmental performance, and guaranteeing the conformity, safety, quality and performance of the cold chain. Cavalier challenged the group: “Let’s have a vision!”

Andy Pearson of Star Refrigeration in the UK highlighted refrigeration technologies, saying the traditional “Perkins Cycle” vapor compression system—with continued innovation—would remain the system of choice in the cold chain. **“There is scope for improving efficiency by 30% and cost by 50%,” Pearson said.** We can also improve the overall cold chain, he added, through new product development, operator training and system integration, better monitors and metrics, and government support and international cooperation.

“Sensors will transform the business like nothing else,” Pearson added. “When they become cheaper than the cardboard box they are delivered in, we will have data everywhere.”

Mark Mitchell of SuperCool Asia in Australia told attendees that **“Improvements in the cold chain to prevent food loss can occur only when collaboration exists between process, vehicle body building and refrigeration.” In particular, he said, “the truck is a critical control point for the entire journey.”**

Arthur Bamunuarachchi of the University of Sri Jayewardenepura in Sri Lanka focused on the promise of solar cooling systems, saying the sun is

a vast source of energy available to be tapped. But, he said, “the industry must leap from a pre-industrial and demonstration status into a competitive market status.”

Finally, the Summit concluded with a series of workshops moderated by Juergen Goeller, Director, Sustainability, of Carrier Transicold & Refrigeration Systems. The first, chaired by Pawanexh Kohli, National Center for Cold Chain Development, India asked: What are the key steps to build a cold chain to reduce food loss? The workshop participants identified five key points:

- 1. There must be a willingness to invest by the owner(s) of the problem.**
2. The cold chain should not be limited to temperature management but include elements of product quality, handling, logistics and packaging.
3. We cannot build cold chains without strong public-private partnerships.
4. We need networks of suppliers and services to help create solutions that are customized to specific needs.
5. New cold chains should use the latest technical solutions, not necessarily the traditional solutions.

The second workshop, chaired by Matthijs Montsma, Wageningen, UR, NL, asked: How do we expand the expiry dates to reduce food waste? Ulla Lindberg, Research Scientist of the SP Technical Research Institute of Sweden, presented new findings to the group, which reached these conclusions:

1. We must understand how the quality of each commodity relates to temperature. This will allow us to match quality expectations to storage and transport conditions.
2. Expiry dates are confusing. We need better education and more indicators.
3. Temperature is important but not the only factor in determining the actual status of the product.

The group also saw the need for more information to create a sound investment model to determine return on optimal temperatures by commodities.

The third and final workshop, chaired by Kevin Fay of the Global Food Cold Chain Council, asked: What is a sustainable cold chain? The group concluded that while the current cold chain is probably not sustainable today, it has the potential to become “green” by incorporating the following ideas:

1. Target opportunities in both developed and developing countries.
2. Don’t be tied to one solution. Recognize that technology and practices are continually evolving.
3. Consider policy. Things such as energy efficiency and refrigerant management are important issues, and respond to guidance from policymakers.
4. Capacity building and education are key. “The benefits of the cold chain are not well understood by the public or throughout the chain in terms of investment components. There is a tremendous need for effective education for people to understand that,” Fay said.

5. Funding is critical for developing countries, and we need creative ideas.
6. As part of the sustainable cold chain, we need adequate infrastructure, especially adequate transportation and reliable energy.
7. Refrigerant management is often overlooked and requires more attention. And, while Low Global Warming options should be pursued, it's important to recognize that food waste is 8% of GHG emissions but HFCs are 1%.
8. Ultimately it was important to take a long-term perspective; it's difficult to take a system that developed over 150 years and fix it in 10.
9. **Perhaps we could develop a LEED-type system of practices to help educate and standardize best practices in the cold chain.**

Finally, the working group wondered, can we reach some consensus around the UN's new Sustainable Development goal? How can the cold chain help to support the reduction in food waste? How do we communicate that?

"The cold chain is not a luxury," Fay concluded. "It is a function of necessity in order to feed the growing population."

Closing Remarks

John Mandyck closed the second World Cold Chain Summit by reminding its 127 participants that **"We have just 10% of the world's perishable food supply covered by the cold chain. This represents a hurdle and the opportunity. In fact," Mandyck said, "the UN's sustainability goal 12.3 calls for halving food waste by 2030. This can be**

a great rallying point for us, and for the world." Delegates again reviewed the UN goal and the summit endorsed the direction.

"Our goal as always is to connect the global dialogue," he said.

"The last 20 years have been the Age of Energy Efficiency, of utilizing the same power base and spreading it efficiently to urbanize in a sustainable manner," Mandyck closed. "Energy efficiency has gone far, with more to go. **But now is the Age of Food Efficiency—when we can use the same food supply base that produces enough food to feed 10 billion people—wasting less to feed more—and avoid more production and the environmental emissions that come from that. Food conservation is equally as important as energy conservation. The potential to do more is just limitless."**