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 Cold Storage Annual Conference



COST-EFFECTIVE REFRIGERATION WORKSHOP

A five day teaching workshop to upgrade your refrigeration and heat pump knowledge

WHERE

The Centre for Postharvest and Refrigeration Research at Massey University, Palmerston North

WHEN

September 2nd to 6th 2024 (Monday to Friday)

This is the 30th offering of this workshop which continues to be demanded by the food and refrigeration industries. Over the five days we'll discuss the technical, commercial and environmental aspects of refrigeration and heat pumping. We hope that this course will be of interest to you or your staff and we welcome your attendance.

This is the workshop for you if you are part of the following industries:

- Businesses using industrial refrigeration equipment
- Refrigeration system designers and contractors
- · Suppliers of industrial and large commercial refrigeration equipment
- Energy suppliers, consultants and researchers

We'll cover both the design and operation of refrigeration systems and refrigerated applications, as well as heat pumping for process heating, and how environmental policy, legislation and regulations impact the refrigeration and food industries.

An optional fifth day is offered this year, where the focus will be using calculation methods provided via spreadsheets.









For more information visit: <u>https://events.massey.ac.nz/cost-effective-refrigeration/</u>

Presenters

Professor Don Cleland and Dr Richard Love will be presenting at the workshop.

They both have extensive experience in refrigeration, heat pumping, design, food processing and preservation, energy management and energy efficiency.





Global Cold Chain Foundation (GCCF) Cold Chain Institutes

The World's Best Cold Chain Logistics Training Program.

This year marks the 59th anniversary of the first World Food Logistics Organisation's (WFLO) Institute held in Norman, Oklahoma – the home of The University of Oklahoma. The three year, industry specific training program put on by WFLO, the foundation arm of the Global Cold Chain Alliance (GCCA), is for professionals engaged in temperature controlled logistics, and offers more than 40 classes taught by leading experts in the industry. The curriculum takes students through cold chain management, customer service, employee safety, food safety, warehouse operations, transportation operations and professional development.

By 2009, the Institute had outgrown Norman and moved to a new home at the Georgia Tech Hotel & Conference Center in Atlanta, Georgia. This new facility allowed for more students to participate in the Institute and offered a connection to Georgia Tech's renowned Logistics and Supply Chain Program. Over the years, it has provided opportunities for Georgia Tech students to participate in the Institute as way to generate broader interest in a career in the cold chain.

In 2014, due to strong interest from members in the region, the first Latin America Institute was held in Costa Rica. The Institute Latin America is now held each year in Mexico City, and while the 2020 Year 1 and Year 2 programs had to be postponed to 2021, WFLO was able to run the Year 3 program virtually and graduate 12 individuals from the program.

Over the years the growth of the program in the United States continued and by 2017, the Institute had grown so much that the foundation Board made the decision to hold two Institutes in the United States to allow for a valuable onsite experience while allowing for more participation.

Thus was born the East and West Institutes. The Institute East is continuing at Georgia Tech and the West Coast Institute is held at the Tempe Mission Palms Hotel and Conference Center adjacent to the campus of Arizona State University where the top ranked W. P. Carey School of Business in located. The East and West Institutes now host well over 500 students each year. In 2019, the first Australian Institute was held in Melbourne, with more than 35 students participating in Year 1 courses. The Institute returned in May 2023 and held courses for both Year 1 and Year 2 students. It will return in May 2024 to host all three years with the first ever Institute Australia graduates.

In 2023, the foundation changed its name from WFLO to the Global Cold Chain Foundation (GCCF) and the name of the Institute program changed from WFLO Institutes to GCCF Cold Chain Institutes. GCCF is expanding the classroom experience by launching two new Institutes in 2024, one in Sao Paulo, Brazil in August 2024 and one in Amsterdam, Netherlands in September 2024. It is fast becoming the world's best cold chain logistics training program to develop your company's most important asset – talent.

GCCF COLD CHAIN INSTITUTES EAST AND WEST

When the challenges are steep and the competition fierce, Robyn Benincasa, this year's Institute East and West Keynote Speaker, provides individuals and organisations the tools they need to inspire themselves and one another to their greatest heights and to cross their most challenging finish lines.

For the last 20 years, she and her teammates have been competing at the front of the pack in the most unique and compelling classrooms on earth: the jungles of Borneo, the Himalayan peaks of Tibet, the rivers of Fiji, the rainforests of Ecuador and the deserts of Namibia, studying the good, the bad, and the not-so-pretty of extreme teamwork. It is through these harrowing, life affirming and often hilarious experiences in the world's most grueling challenges that she has emerged with her truly unique perspective on what it takes to build the kind of world class teams that succeed against all odds, triumph in the face of adversity and win as one in times of great challenge and change.



GCCF Cold Chain Institutes Continues

Robyn accepts full blame for inspiring people to do insane things like climb Mount Kilimanjaro, run their first triathlon, start their own adventure racing teams, hike across the Grand Canyon with a group of Survivors, or start their own businesses. This is, after all, who she is and what she does: Robyn Benincasa inspires people to grab life with one hand, grab their teammates with the other, and to create that special magic that makes all of us better TOGETHER than we ever would have been alone!

Robyn has made an art form of extreme performance by competing and winning at the highest levels of sport and business; her keynotes are powerful, impactful, and packed with practical, real world takeaways that inspire peak performance and exceptional leadership. As a plus 20 year veteran San Diego firefighter, a World Champion Adventure Racer, a 2014 CNN Hero, a Guinness World Record Endurance Kayaker, a best selling author, and founder of The Project Athena Foundation, Robyn Benincasa definitely knows a thing or two about creating human synergy, or as Robyn puts it, "That magic that allows groups of ordinary people to accomplish extraordinary things together".

Robyn's multi-faceted experience inspires people to grab life with one hand, grab their teammates with the other, and to achieve audacious goals that they could never accomplish alone. She is the expert that companies call on to build world class teams, inspire peak performance and create a culture of champions.

Reference: Global Cold Chain Alliance (GCCA) For other related articles, <u>click here</u>.

Inflation Falls – But Still Too High

The key piece of news relevant to the New Zealand economy, interest rates, and the housing market this week came out yesterday in the form of the quarterly Consumers Price Index.

Every three months Statistics New Zealand surveys the prices of almost 650 items which Kiwi households tend to consume on average. They alter the basket of goods over the years to take out and reduce the percentage weighting of things we buy less and less of, like CDs, and increase the weighting and put in things we buy more of, like online services.

All the numbers are added together to produce an index which was set at 1,000 in the March quarter of 2017. Inflation is measured as the difference between this index in one quarter compared with another. For instance, in the March quarter of 2018 the index was 1011 therefore inflation for that year was 1.1%.

The change in the index can roughly be read as a measure of the change in our cost of living although no two households are the same and we can only talk in averages. In particular, the CPI does not include interest costs, so over short time periods it is more accurate as a measure of the change in living for the two thirds of households who do not have a mortgage than the one third who do.

Nonetheless, we can roughly say that the cost of living for the average Kiwi household has risen by 21% since the end of 2019 just before the pandemic got under way. I like to reference this time period because people talk misleading in terms of a cost of living "crisis". But, since the end of 2019 average wages in New Zealand have risen some 25%.

Real, meaning inflation adjusted, wages have risen on average 0.9% a year over the past four years which is only just below the average real wage gain for the past two decades of 1.2% a year. The cost of living pain is largely being felt by those people who have not gained good wages growth these past four years.



Inflation Falls – But Still Too High Continued

But that issue aside, what we learnt yesterday was that the CPI rose to an index reading over the December quarter 2023 of 1259.

The index in the September quarter was 1253 therefore on average in the December quarter consumer prices rose by just under 0.5%. This was less than the 0.8% expected by the Reserve Bank but bang on market expectations.

A year ago the index reading was 1203 so the country's official inflation rate is now 4.7% compared with 5.6% before the release, a peak of 7.3% in June quarter 2022, and the average rate since 1992 of 2.3%.

Does the lower than RB expected result and decline to the slowest pace of inflation since June quarter 2021 mean monetary policy will be imminently eased? No, for a number of reasons.

First, at 4.7% inflation is still well above the Reserve Bank's target range of 1% to 3%.

Second, a key driver of inflation is wages growth and there is as yet a lack of evidence showing that growth slowing rapidly in response to the record net migration surge, weak business labour demand, and the easiest labour sourcing conditions for firms on average in 14 years according to the NZIER's Quarterly Survey of Business Opinion recently released.

The Reserve Bank will want proof of much slower wages growth before signalling an imminent easing of the official cash rate from the 5.5% level they took it to in May last year.

Third, some of the underlying measures of inflation are still much too high. For instance, while average prices of things traded across the border (tradeables) fell 0.25% in the December quarter to lie just 3% ahead of a year ago, prices of domestic focused things (non-tradeables) rose 1.1% in the quarter (4.4% annualised) and 5.9% in calendar 2023.

The tradeables inflation measure can get whipped around by movements in offshore inflation, oil prices, and the exchange rate. But domestic, non-tradeables, inflation tends to more reflect the inflation producing conditions in the economy upon which monetary policy acts.

At 5.9% non-tradeables inflation is still well beyond the pale.

I could go into greater detail with discussion of inflation excluding food and energy (a popular measure in the US), the trimmed measure which excludes the top and bottom 10% of price movers, and details of the near 650 items. But such discussion would not change the conclusion above.

Inflation remains too high still in New Zealand for any immediate easing of monetary policy.

However, with many indicators suggesting:

- weakness of late 2023 continuing into the first half of this year,
- still falling dwelling consents and below average consumer sentiment,
- tightening fiscal policy, and
- rapidly easing labour market.

The financial markets are likely to continue pricing in an easing of the OCR from about the middle of this year or thereabouts.

We should not be surprised that when the announcement of an easing comes from the RB it will probably be a surprise.

Reference: Tony Alexander Economist

More from Tony Alexander, Economics Speaker and Writer, <u>click here</u>.





Modernising Our Refrigerated Fleets

Regulatory climate and ESG concerns are driving electrification of Heavy Goods Vehicles across the United States.

The transportation sector is increasingly required to cut emissions and go green. In fact, some U.S. states have set goals and specific targets for doing so.

California, in particular, has a goal of fully transitioning the trucks that travel across the state to zero emissions technology by 2045, and is requiring that no more internal combustion engines (ICE) vehicles be sold in the state by 2035. California officials claim that while trucks represent only 6% of the vehicles on California's roads, they account for more than 35% of the state's transportation generated nitrogen oxide emissions and a quarter of the state's on road greenhouse gas emissions.

According to a report by McKinsey & Company, around seven million medium and heavy duty freight trucks circulate the United States today, and almost all are powered by ICEs. The Environmental Protection Agency (EPA) estimates that these vehicles generate more than 25% of total greenhouse gas emissions (GHGs) from the transportation sector.

For the last few years, California and its zero emission regulations by the California Air Resources Board (CARB), and other environmental, social and governance (ESG) goals have been the primary force behind refrigerated transportation companies investing in the electrification of fleets, explains Don Durm, Vice President of Strategic Customer Solutions at PLM Fleet.

"The Governor's Executive Order N-79-20 requires that by 2035, all new cars and passenger trucks sold in California be zero emission vehicles. Under the order, CARB is mandated to develop and propose strategies to achieve 100% zero emissions from medium and heavy duty on road vehicles in the state by 2045 where feasible and by 2035 from drayage trucks," he says.

Meanwhile, another 15 states are supporting the rapid adoption of zero emission vehicles (ZEV) that will drive new regulatory requirements for these states. "California of course is the blueprint for this accelerated adoption of ZE commercial vehicles," Durm says.

Durm emphasises, however, that ESG is the main driver today for companies that may not even consider the regulatory environment. "Ninety six percent of the top global corporations all have sustainability / ESG goals that are well defined and messaged," he says. "Trading partners to consumers are all wanting to know what you are doing in this arena to do business with them. We have all become social buyers."

He points out how today, there are even services that keep ESG scores. "These are an essential tool for investors to assess a company's sustainability and ethical performance," Durm adds.

These scores typically range from 0 to 100, with a score of less than 50 considered relatively poor and more than 70 considered good.

"Companies are not only evaluated by their return on the investment, but also their ESG scores," he says. "Companies need to be aware of this important subject."





Modernising Our Refrigerated Fleets Continued

OVERWHELMINGLY COMPLICATED

Switching to a ZE fleet, however, is not simple by any means. "In fact, the issue is overwhelmingly complicated," says Peter Schneider, Director of Sales & Project Management, GirdMarket.

While trucking companies continue to invest significant money on research and development and introduce commercially viable products, the options are few on the trailer side of the business, Schneider reports. "There are probably about two to three products on the market that you can use. Each of them has problems," he says.

The other problem is infrastructure at cold storage facilities that is required to handle the environmentally friendly trucks and trailers, such as chargers.

In California, there's also the reality of how utilities are going to be able to handle the additional electricity requirements, especially given the state's history of rolling black outs, limited power supply, and high cost of electricity, Schneider points out.

"When you look at a facility – even a big, refrigerated facility – and you want to electrify a fleet of 20 to 50 classic trackers, the demand profile of that building is going to change by a magnitude of two to three – minimum," he says. "Consequently, so many operators feel the odds are stacked against them. There is so much complexity, uncertainly and frustration in the market about how all of this is going to come together."

Creating systematic and programmatic electrification systems also vary greatly depending on the size of the company. That's because the conversation is not the same when talking to large, refrigerated distributors versus smaller companies. Among some of the issues that might be addressed are how to reduce a facility's electrical load, and, in that process, consider the right location for accepting customer ZEVs that are dropping off and picking up shipments and require electric chargers.

"It's less of a requirement for some that do not have a fleet to direct or operate," Schneider says. "However, it's a business / revenue opportunity despite the fact it's uncertain what it will look like and how much will be needed."

RAPID DEMAND

Industry experts emphasise that despite the many complications, the need and demand for electrification systems is going to start happening quickly.

"The better positioned you are early on, the more revenue you will be able to take and the better you will be able to operate your business development," Schneider stresses. "And, you'll be better able to attract different types of customers over your competitors and help their needs. That is really where the thinking is."

Not many entities are focusing on these developments with the exception of those in states with the most aggressive regulatory requirements such as California. And there it's especially companies in California involved in drayage.

"They are basically saying that starting in January, you cannot register a new drayage vehicle that is not electrical," says Schneider. "All existing ICE must be registered by the end of 2023 and grandfathered in. That means soon all drayage vehicles will be electrified." But a bigger question is, who holds the charging infrastructure? The ports, the drayage operator, the drop location? "It's most likely a healthy mix of all," says Schneider.

Ports are working hard on electrifying and creating charging infrastructure. But many in the industry question whether or not there will be enough. "What will the ports be able to offer in terms of the right level of support for this requirement they are creating?" Schneider asks.

His company is already in conversations with 3PLs that are operating out of the Ports of Los Angeles and Long Beach regarding installing Level 2 / Level 3 chargers at their locations.

"The idea is to create a revenue model and see what happens," Schneider says. "It's not a massive investment and the hardware should work well during the next six years. Let's set this up and create the right kind of risk of environment for your entity and see how we can start the pilot test."



Modernising Our Refrigerated Fleets Continued

He further notes how many 3PL providers let hybrid trailers operators, of which there are many, charge these at their facility free of charge. Schneider suggests recapturing revenue that is being lost by letting operators bleed electricity and creating a new revenue.

Durm notes that a new regulatory environment is shifting the burden of energy expenses from fleets to warehouses.

"When you are utilising ZE units that you plug in at the warehouse and no longer need to wet hose diesel, that cost needs to be accounted for on the P&L from the fleet to the warehouse," Durm says. "If you are strictly a warehouse and you have no assets plugging into your warehouse, there must be a way to capture and pay for that so that you do not bare the expense."

An answer would be adopting the Tesla charging business model – hiring companies to come in and build them for you and pay as you use them – Durm suggests. "One thing, industry needs to settle on one universal plug, or this will a nightmare," Durm adds.

FUNDING AVAILABILITY

Multiple funding options, such as grants and incentives, are available for transportation companies to move to these more sustainable models.

For tractor trailer operators, make-ready programs such as those in New York, California, New Jersey and Massachusetts help fund the infrastructure aspect of charger projects. But to be eligible, trucking companies need to prove they are taking ICE vehicles off the road.

3PLs / warehouse operators may be able to take advantage of specific grants, depending on their utility.

While some available funding such as California's Clean Off-road Equipment Voucher Incentive Project (CORE) has been used up, other available funding coming is the Inflation Reduction Act of 2022 tax credits for clean energy, which is intended to increase U.S. manufacturing of solar, wind and batteries and offer tax credits for U.S. electric vehicle production. "It is important for companies to collaborate with the right partner to help them navigate the complexities of grants and funding for their projects," says Durm. "It is nearly impossible for companies to figure this out on their own."

But Durm likes to dwell on the fact that simply going green saves a company "green," i.e., money. "It is our experience in the deployment of ZE refrigerated trailers over the past decade, with a number of companies, that operational efficiencies can save real dollars that far exceed what you can secure in funding," he says.

FINAL ADVICE

Meeting regulatory requirements and devising a plan that makes business sense for the next 12 months is hard for most companies to conceptualise.

"A lot of fleet operators are struggling with this," says Schneider. "When you extend that to a warehouse operator (3PL), it becomes even harder for them to wrap their heads around it."

Many are not certain what the industry will look like over the next 18 months, so the uncertainty on how to deploy resources and capital is very confusing.

"Many are holding out to see where things stand a year into the drayage rule," Schneider says. But the issue remains: how do providers set themselves up for success not too early and not too late.

Consequently, the biggest takeaway advice is for providers to partner with an experienced vendor to help manage the process and avoid the mistakes that would normally be made while implementing a ZE strategy.

Further, Durm emphasises the need to understand how this will change management. "You really need to understand human behavior and how this will need to change," he says. "Again, partnering with the right vendor will help guide you through this process."

Reference: Karen Thuermer, Global Cold Chain Alliance (GCCA)

For other related articles, click here.



Data Demands Soar, Cold Storage Tech

The Director of National Intelligence has commissioned a National Academy of Sciences study on long-term cold storage technology as the Intelligence Community predicts hyperscale-level storage requirements due to soaring data demands.

The US National Academy of Sciences has commissioned a study on long-term cold storage solutions for the Office of the Director of National Intelligence.

The 'rapid expert consultation,' available in full here, looks at different archival data storage technologies for the intelligence community (IC) as the data storage requirements soar.

"In the near future, IC member agencies expect to maintain amounts of data at a scale comparable to that of a large corporation like Meta or Amazon," the report states, suggesting surveillance data could rival that of an entire hyperscale businesses.

"The IC has the potential to be one of the largest customers for cold data storage because of its wide ranging need for information.

It's important to note, however, that some of the authors of the report declared competing interests; in particular, one is employed by Microsoft, is developing the Project Silica cold storage solution.

Another works for a company that contracts with Ceramic Data Solutions, which is tied to the Cerabyte cold storage product. Both are detailed in the report as potential future solutions.

WHAT WE HAVE NOW

Under current technologies, the report looks at hard disk drives (HDDs), noting that heat assisted magnetic recording (HAMR) advancements could "produce hundreds of terabytes (TB) of HDD capacity per unit." The report continues: "The current HDD price on average is expected to be around \$0.015/GB. With technological advancements like HAMR, cost decline is expected to continue.

The expectation for HAMR is between 15 to 25 percent compound annual growth rate.

That said, the super paramagnetic effect, a physical limit on the amount of data that can be stored on a hard disk, poses long-term challenges to the future scaling rates of HDDs."

HDDs only last around 5 to 10 years, but the researchers believe that the IC could request that HDD manufacturers produce specially designed HDDs with extended lifespans.

The next technology analysed is magnetic tape, which primarily follows the magnetic linear tape open (LTO) open format standard. LTO releases have historically occurred on a roughly 3 to 4 year cadence, each time roughly doubling storage capacities.

That improvement has slowed as of late, but LTO members believe that they have a decade at least before they hit the same super paramagnetic effect limits.

Tapes can last 30 years if stored properly, and are easy to dispose of. However, they are 'write once, read many' technologies.

Next, the report looks at SSDs, which are the "workhorse for primary storage today." It adds: "It is to be expected that NAND flash will scale to thousands of layers and through packaging innovations as well as multi-wafer-to-wafer bond structures. For example, Samsung has discussed the possibility of the capacity of a single SSD increasing to 1PB, with pricing to advance to below \$20/TB by the end of this decade."

Within the decade, the researchers predict rack capacities of more than 100PB. However, SSDs are not suitable for long-term storage.

Similarly, magnetoresistive random access memory (MRAM) is not optimised or suitable for long-term storage.



Data Demands Soar, Cold Storage Tech Continues

"However, MRAM may have a role to play as part of a larger storage system that requires extremely quick data recall," the report says.

More long-term storage focused are optical storage systems like Blu-ray, which Meta has used in the past for its cold storage. "This effort seems to have been quietly abandoned," the researchers say, noting limitations in data storage density.

THE FUTURE

The report profiles a handful of upcoming technologies that could handle the coming wave of data.

"There are only two candidate technology domains that hold promise to meet these scaling goals: organic storage, with the lead technology being DNA data storage, and inorganic storage, with the lead technology being optical or particle data storage, such as Microsoft's Project Silica and Cerabyte's Ceramic Nano Memory."

It adds that the US government should fund disruptive new innovative data storage technologies, pointing to the existing Molecular Information Storage Technologies (MIST) program out of the Intelligence Advanced Research Projects Activity. MIST aims to explore the use of scalable sequenced controlled polymers for long-term data storage.

DNA storage could offer "tremendous density" and last for thousands of years, but the technology is still too expensive and slow. The MIST program aims to make DNA data storage at 1TB/system at \$1/GB for enterprise archival use with end-to-end workflows on a tabletop by 2025.

Microsoft is a little further along with its Project Silica, which uses a femtosecond laser to encode data in fused silica glass by creating layers of three dimensional nanoscale gratings and deformations at various depths and angles.

In 2023, the company said that it was now capable of storing 7TB on one glass sheet. Once the data is encoded on the glass, it requires no further energy to maintain its state for the next 10,000 years.

The product is in the prototype phase, but the company plans to roll it out to Azure data centers in the future. Rival Cerabyte uses a glass substrate with ceramic nano-coating as a data storage medium.





Data Demands Soar, Cold Storage Tech Continues

"Using femtosecond laser technology, initial densities of 125GB per data medium with 100 nm bit size, data center rack densities up to 100PB are achievable," the report says.

"This can be scaled to 1TB+ per data medium with 30 nm bit size, translating to data center rack densities of up to 1EB using particle beam technology, which has been demonstrated in proof-of-concept studies."

Should helium ion beam technology scale bit size down to 3 nm, this could "enable up to 100EB data center rack storage capacities by the middle of this century."

Cerabyte plans to work with research laboratories this year, which should provide more insight into its product roadmap.

THE NEED

Even outside the IC's desire to store more than ever, there are many industry observers that are concerned that the

desires for data storage are set to dramatically outstrip what current technologies can store. "The fear of vertical market failure is driven by the slowing rate of improvements to HDD and tape storage and the need for storage providers to continue to compete on storage pricing," the report says. "This leads to smaller profit margins on storage, which disincentives manufacturers from assuming innovation risks when investing in new technology."

At the same time, "a small number of companies have come to dominate the zettabyte scale archival storage market. The supply and demand side consolidation increases the risk of a single point of failure that could disrupt the entire archival data storage media marketplace."

The authors again call for more government support to help fund the future of storage.

Reference: Sebastian Moss, Data Centre Dynamics (DCD). See article 'The Last Data Center', <u>click here</u>.



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NZ Cold Storage Annual Conference

Theme: Cold Logistics Excellence: Optimising Efficiency, Performance and Sustainability



At the Millennium Hotel, Queenstown

Programme Overview

Sunday 11 August 2024

1pm – 5pm: Optional Activities* 5.30pm – 8pm: Welcome Function & Networking

Monday 12 August 2024 - Conference Day 1

From 8am:	Registrations open and arrival tea and coffee
4pm – 5pm:	AGM
6.30pm – 7pm:	Pre-Conference Dinner
From 7pm:	Conference Dinner
9am – 4pm:	Conference Sessions

Tuesday 13 August 2024 – Conference Day 2

From 8.30am:Registrations open and arrival tea and coffee9am - 3pm:Conference Sessions3pm - 3.15pm:Trade show prize draws3.15pm:Conference Close

* Optional Pre Conference Activities: Beer Tasting / Golf / Wine Tour

REGISTER ONLINE HERE