With the rapid growth in global populations that has characterised the modern era, food wastage has become one of the most pressing social issues. Each link in the food supply chain has its part to play in reducing waste, shipping included.

According to the Food and Agriculture Organisation (FAO) of the United Nations, which conducted a landmark study on food loss and wastage around the world in 2012, around 30% of the food the world produces is lost each year; this equates to a mind-boggling 1.3bn tonnes wasted every year.

There is not a single food type that does not see significant wastage, and it can take place at almost any point of the “farm-to-fork” supply chain.

Where and when can vary wildly depending on geographic region and type of food product – some 30% of global cereal production is lost, with households in developed counties throwing away 283m tonnes a year;
35% of fish and seafood catches are lost, equivalent to three billion Atlantic salmon, thrown overboard before they are even processed.

Worst of all is the 45% of the world’s fruit and vegetable volumes – equivalent to an almost unimaginable 3.7 trillion apples a year – lost at a variety of stages in the food supply chain: during agriculture; post-harvest; processing; distribution and consumption.

The loss varies, depending on geography. In Northern Europe it is far more likely to take place at the consumption stage, either from households throwing out still-edible goods or supermarkets unable to sell “wonky” fruit and vegetables. In food-exiting areas, such as sub-Saharan Africa and Latin America, there is more wastage at the post-harvest and distribution stages of the supply chain.

These numbers suggest that everyone in the food supply chain, including the shipping industry, has a part to play, and a common reaction from various quarters to the FAO statistics was incredulity at the sheer amount of waste – although to a large extent, that was because it simply had not been recorded before and, as the saying often goes, “you cannot solve what you cannot measure”.

While shipping lines claim that as little as 1-2% of product is wasted under their care, the development of refrigerated container (reefer) transport has become a truly multimodal offering, rather than a purely maritime service.

It is for this reason that the development of a remote container management (RCM) system by Maersk Line, as well as separate, independent projects undertaken by technology companies, are expected to play a crucial role in eliminating waste and improving cargo care. Harnessing global satellite networks, mobile phone technology and new thinking about what data they can deliver will allow shipping lines to meet these challenges far more effectively than has been done in the past.

Reefer containers have widely been credited for expanding global trade in...
fresh foods; their integrated, almost self-sufficient, nature enabling the door-to-door transport of 29 tonnes of goods from anywhere in the world to virtually anywhere else. And by their very nature, with generator sets (gensets) attached, they ought to ensure continuous chilling of these goods irrespective of where they are.

Yet most fresh produce shippers and receivers have at least one gruesome tale concerning ruined cargo, and in today’s era of global mobile communications many cannot understand why there is not a more all-encompassing way to monitor the reefers and the condition of their cargoes.

In short, there appears to be a classic gap between expectation and reality. Cargo owners that live in a world of smartphones, and are e-commerce consumers in their own right, have difficulty understanding why they cannot access information about the status of their goods at any given time, no matter where in the world those goods might be – and, primarily, what condition those goods are in.

But it is not just enhanced monitoring that will enable greater degrees of cargo care, but also the increased data levels that will allow Maersk and its customers more insight into the root causes of damage to goods.

Shipping lines, on the other hand, are still working through the logistics of trying to secure that end-to-end visibility and the data flow required to achieve it. Most container vessels with significant amounts of reefer plugs will have one or two technicians whose job it is to monitor the performance of the units while at sea, although rough sea conditions can often make that job physically impossible.

And, as Henrik Lindhardt, head of reefer research and support at Maersk Line, tells The Loadstar, reefer units have been able to convey some data for at least the past two decades.

“We have had reefer monitoring before, which was transmitted through the power cable in a concept that was...
Pre-trip inspection time has been reduced from six hours to 12 minutes.

To Maersk’s data centre.

The data chain.

1-2% of perishable goods shipments are damaged during maritime voyages.

12 nautical miles from land.
developed by a third party, and we have used this for more than 20 years.

“It was fine until we began to load more reefers than anyone previously imagined, then the limitations of the system became apparent,” he says.

Over the past few years, it has become increasingly obvious to the world’s largest container line that having more information about the status of its reefer units would be of considerable benefit to its own operations – let alone the opportunities it could ultimately provide in the way of improved cargo care and customer service.

And this led it to develop a remote container management (RCM) project that would seek to revolutionise the way it collected and processed the huge amounts of data it is possible to capture from reefer units.

Clearly, some of the philosophy behind it had been inspired by ongoing IT developments in Big Data and the Internet of Things – unsurprising, given that the company boasts an “innovation lab” to develop new maritime solutions and technologies, and adapt advances in other sectors to container transport systems.

Maersk Line’s head of reefer management, Shereen Zarkani, says: “The starting point for this project was to obtain visibility at a very granular level – knowing where each container is, including when it is en route to the port; on the sea; in the terminal; when it is gating in and out; and so on across all the links in the supply chain.

“What we are looking for is the ability to aggregate all the bits and pieces of data, which then gives us further insight into operations such as equipment maintenance and repair (EMR). The data has always been there, but it is difficult to bring it together.”

In reality, putting RCM infrastructure in place represented a considerable challenge in itself [see box on page 2 for how the technology works]. A remote container device (RCD) had to be fitted to each of Maersk’s 270,000 reefer units dotted around the globe, as well as the VSAT domes and antennae that had to be installed on its 270 owned vessels, and another 130 on long-term charter.

“If you want to monitor the reefers then it needs to be in all the reefers, otherwise some will still have to be physically monitored,” Mr Lindhardt explains. “It has to be full-scale – a total roll-out.


“ ‘What is really interesting is that we are beginning to see changes because of the intelligence we get out of the reefer, and we are starting to find new ways of interpreting it’ ”

“That was very difficult because all the assets are moving. When you think the container is in one place, it has been moved to another. A moving target is harder to hit, and it is fair to say it has taken longer than expected.”

However, the five-year project went live in the middle of last year, says Catja Rasmussen, head of remote container management for Maersk.

“We chose some installation locations based on where the reefers were; and most of the work took place in 25 key ports around the world. In the beginning we were achieving about 7,000-8,000 installations a week, but by the end we were only managing to do five in a week as we searched for the last few reefer units,” she says.

At the same time, she adds, the line’s IT department had to create a new database to process the large amounts of information that it has begun receiving. But already the implications of the insight this could create both for the carrier and its customers are beginning to become apparent.

“The key challenge now is to figure out the new potential of the data because we are receiving so much of it,” says Ms Rasmussen. “What’s really interesting is that we are starting to see changes because of the intelligence we get out of the reefer, and we are starting to find new ways of interpreting it.

“And you can combine RCM data with other data to create new insights. For example, if certain alarm types are triggered, we can now begin to see if they combine with other occurrences and lead to concrete actions.

In food-exporting areas such as sub-Saharan Africa, there is more wastage at the post-harvest and distribution stages of the supply chain
“This will enable us to be more proactive in fields such as the maintenance of container and cargo, and that’s where we want to take this kind of technology. This will be a real benefit to customers,” she says.

An improvement of reefer maintenance is one obvious area. Each reefer has to have a pre-trip inspection (PTI) to ensure its condition before it is delivered to the exporter, and which can typically take up to six hours.

Ms Rasmussen says: “With RCM, we have developed an e-PTI method that can take that process down to 12 minutes by calculating the condition the reefer is expected to arrive at the inspection point in,” she adds. And Ms Zarkani says improved control of reefers while at sea is already beginning to filter into voyage operations.

“The cargo care can be improved on the ships – the reefer technicians aboard now receive data from each container every hour, and if there is a problem they now have the visibility to fix the box that needs attention.

“Those functions in themselves will save a lot of cases. I need the claims to go down, otherwise it’s a lose-lose situation for us and our customers. Think of all that wastage in terms of money and time and effort that could be saved. For me, this is the biggest improvement that RCM would allow – it will hugely increase the level of cargo care,” she says.

Ultimately, this will have significant implications for cargo owners, as some have begun to recognise.

Chayenne Wiskerke is managing director of Wiskerke Onions, the largest exporter of onions out of the Netherlands, with around 5,000 40ft reefer shipments a year. She says she has long been looking for greater control over conditions in the supply chain.

“I understand that it is quite tricky, but today the possibilities exist – the data is there. It is just that container lines do not want to share it yet. But that is coming to an end because they are beginning to capture that data,” she says.

However, Maersk executives are urging patience, as RCM only went live a few months ago and it remains early days, as Ms Zarkani reveals.

“So far we have begun to review some of the standard operating procedures, but 2016 is the year that we will explore what insights the data can provide for both us and our customers.

“At some point I would of course like to commercialise, but how do you do that? And in what areas? Then there is creation of a front-end for customers to further consider.

“But there is no doubt that this is a game-changer,” says Ms Zarkani.

Michael Dempsey, vice president of container and port solutions at Orbcomm, a company that runs machine-to-machine communication networks and has also developed a reefer monitoring solution, says there is a “bundle” of areas where carriers can realise a return on investment (ROI) in the technology.

“There are hard ROIs in terms of reducing direct operational cost savings and managing business complexity, and soft ROIs such as improving a carrier’s business competitiveness.

“The technology eliminates third-party services, data charges and monitoring costs; and it reduces internal operational costs in the way that Maersk have described, such as PTIs. It also reduces cargo theft, maintenance and repair costs and container damage.

“In terms of managing business complexity, the level of control offered by the systems reduces equipment repositioning costs; increases asset utilisation; reduces insurance claims and increases food safety compliance.

“And there is a ‘softer’ gain as well – the transparency they provide increases customer satisfaction and that will give carriers a clear competitive advantage,” he says.

Interestingly, the transparency that this monitoring offers is also being welcomed by Maersk’s erstwhile competitors.

The Loadstar spoke with the managing director of one of the largest conventional reefer shipping lines, who claims that it would
benefit the industry as a whole because of the increased engagement with customers that it creates.

"Container monitoring like this would be good for the industry – customers have been asking for it and by satellite you should be able to read it. Whichever shipping line it is, it is the carrier’s responsibility to be totally transparent in the service we supply.

“I wonder whether you want to know everything – you can have sleepless nights if you see the temperature go down by half a degree, which might not harm the food itself,” he says.

However, he also questions where this will lead in terms of control over the equipment. “What if shippers are able to influence the temperature, because once you get into that part of logistics, it gets very risky with insurance and so on, because there are issues with who has done what.”

For Ms Wiskerke, the potential for greater continual control over reefer conditions would make a material difference.

“We would like to have control over the temperature and humidity. Currently it is very hard to get this data from the shipping lines to see what temperature areas the container is going through, for example. Currently all the exporters use the same settings and there has never been a project to see what is the optimal setting for a particular destination.

“If we go to Brazil or Asia, we use the same settings, even though the vessel goes through different temperature zones. It would make a lot of sense if we can live view the current temperature in the container to make the most optimal setting for the onions to be kept at. If you can keep them at that setting, you have higher quality at the end destination. But you need to have the right data to make the best decisions.

“That comes through monitoring the live flows so we can keep our product at the most optimal temperature – and if I can do that, then the carrier and shipper will be stronger together.”

Once a truck is on the road, the local mobile network swings into action to track the shipment

At Maersk Line, we’re always inventing new solutions to improve cargo care. One of our new developments is called Remote Container Management (RCM), which turns the refrigerated container into a digitally connected device.

Fully implemented in our 270,000 refrigerated containers, RCM provides data on the container including its location, power status, temperature, humidity and ventilation settings. This means you benefit from greater peace of mind and improved quality of your cargo upon arrival!

It’s a game-changer in the world of refrigerated transportation, and a new step in our quest to ensure that your goods arrive in the exact condition intended.

Get in touch with your local Maersk Line representative or go to maerskline.com to hear about the benefits of these smarter containers.