

Play it cool

Logistics systems in the developed world continue to evolve at breakneck speed, but their counterparts in emerging nations are lagging behind, meaning drugs and vaccines are not being delivered in optimum condition or in the correct quantities. Elly Earls talks to **John Lloyd** of Project Optimize about the initiatives underway to change this.

Over the past ten years, enormous amounts of money and energy have been injected into the development of new, life-saving vaccines. Current vaccination programmes save three million lives each year, and this is likely to increase as more innovative products move into development. But are the supply chain systems that support the delivery of these ground-breaking vaccines as innovative as the products themselves?

“The PATH/WHO Optimize project aims to implement effective supply chain solutions in developing countries on a large scale by 2020.”

Bill and Melinda Gates have christened the next ten years ‘the decade of vaccines’, promising that their foundation will commit \$10 billion to help research, develop and deliver vaccines for the world’s poorest countries, with ‘deliver’ being the operative word. The sad fact is that because the logistics and distribution systems are not yet up to scratch in these countries, vaccines are often either rendered useless by the time they reach their destination or are not being delivered at all.

John Lloyd

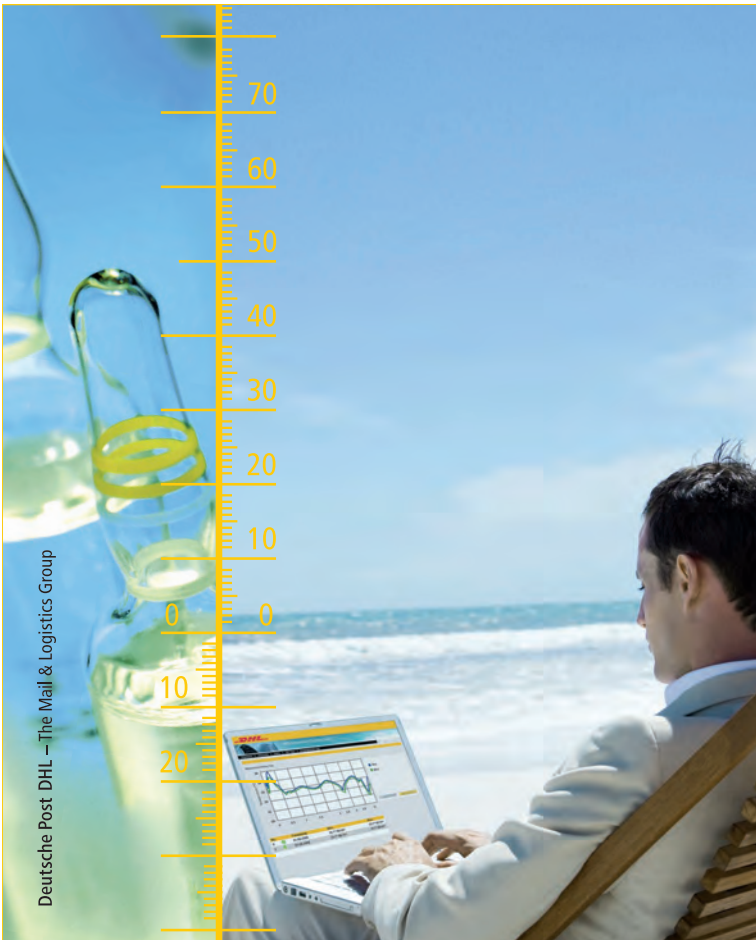
John Lloyd is a senior technical advisor for PATH. He is currently working on the development and introduction of a software application to plan for future equipment needs in cold chain systems.



The multi-billionaire philanthropists are involved in a programme known as Project Optimize, a collaboration between the World Health Organization (WHO) and PATH, an international non-profit organisation dedicated to improving global health. The project aims to improve the logistics and distribution systems in resource-poor countries by encouraging the various stakeholders involved in immunisation to put their heads together and implement the changes needed to get the systems up to modern standards.

“It’s quite an unusual project in that it’s all about a vision of the future,” says John Lloyd, senior technical advisor for the PATH/WHO Optimize project, which aims to implement effective supply chain solutions in developing countries on a large scale by 2020.

“We’re looking outside immunisation to the public health field, and further than that, looking outside public health programmes to the private sector to determine what standards they are using and which developments they are pursuing.” >>



Deutsche Post DHL – The Mail & Logistics Group

BE CLOSER TO THE DISTANCE.

.....

Take the easy way and feel independent by monitoring conditions anywhere you want – anytime!

Peace of mind to concentrate on your core business: we'll manage your temperature sensitive products flexibly and seamlessly – from organising the cold chain to scanning and documenting the data in near real time. And our web portal lets you conveniently monitor the entire process.

www.dhl.com/smartsensor

SMARTSENSOR
GSM

EXCELLENCE. SIMPLY DELIVERED. **DHL**

Palletshipper 1200L

World Premiere Monobloc

No Thermal Bridges

Easy handling, Front opening, Stackable, 1 or 2 Compartments, Safety Closure, High Density Polyurethane



Our insulated packaging :
pré-qualified
validated up to 120 hours

- * Polyurethane monobloc boxes
- * Reusable robust polypropylene boxes
- * Dangerous Goods Packagings
IATA, IMDG and ADR/RID

Testing & Research Centre :

- * Our testing facilities meet the highest norms in Cold Chain equipment
From -40°C up to +60°C
Testing according to existing standards ISTA, CCS, AFNOR, WHO, ... or specific profiles

EXAM[®]
PACKAGING

EXPERTS IN PHARMACEUTICAL ISOTHERMAL PACKAGING

info@exampackaging.com

+32 (0)2 460 77 55

Belgium

“Project Optimize is working on bringing four vaccines out of the cold chain: hepatitis B, yellow fever, pneumococcal and meningitis, of which meningitis is likely to be the first.”

There are three arms to the project, which Lloyd terms ‘a suitcase of changes’.

- **Demonstration:** Project Optimize is demonstrating new supply chain systems and technologies in pilots across four developing countries – Vietnam, Albania, Tunisia and Senegal.
- **Enabling change:** Working closely with organisations such as the WHO and UNICEF, the team at Project Optimize is working on developing the systems that enable change and result in recommendations for countries. How can these countries actually achieve changes in policy and technology?
- **Getting the message out:** This sector of Project Optimize is about encouraging the stakeholders of immunisation to participate and start aligning themselves in favour of certain changes.

Beyond the cold chain

At present, all vaccine manufacturers require their products to be stored within the cold chain, even if they are heat stable – a heat-stable vaccine can be stored safely within a temperature range outside the cold chain parameters of 2-8°C and has heat-exposure indicators attached to it. Yet some of these vaccines are already being taken beyond the cold chain at the field level in order to enable immunisation in remote areas.

“We don’t think this is sustainable because it is not accepted by the manufacturers,” says Lloyd. “It’s not a long-term position.”

Project Optimize is working on bringing four vaccines out of the cold chain: hepatitis B, yellow fever, pneumococcal and meningitis. For Lloyd, meningitis is the most likely to come out of the cold chain first because its manufacturers are behind the idea.

One of the main challenges to ensuring that the other vaccines get to the position where they can be relabelled as heat stable is that their manufacturers are demanding clinical studies to demonstrate their stability outside of the cold chain. This is certainly one of the slower-moving concepts within Project Optimize, but its impact could be wide-ranging, according to Lloyd.

“The broader picture is that if we are able to get some of the vaccines out of the refrigerated cold chain by 2020, we’ll be taking them into the controlled temperature chain,” he explains. “We’d then be keeping them at room temperature, but in a controlled fashion, something that is less demanding than keeping them refrigerated.” >>



CRYO STORE

Packaging

Logistics

BioBanking

Trusted Partner in BioBanking, Packaging and Logistics

Visit Handelswei 1^A
8501 XJ Joure
The Netherlands

Post P.O. Box 59
8500 AB Joure
The Netherlands

t 0031 (0) 513 41 59 65
i www.cryostore.com

With more than a third of the pharmaceuticals being used in Optimize's demonstration projects supposed to be protected at room temperature anyway, resource-poor countries need to be developing technology to support the controlled temperature chain.

And with both vaccines and drugs set to require these systems, the long-term pointer will be to integrate the storage of the two.

Unfortunately this is easier said than done. While it could be achieved in some countries through some simple architectural amendments, such as increased insulation and ventilation, the buildings are sufficiently sub-standard in other regions to mean that additional equipment is also necessary.

"We're looking at both the energy and cost aspects of this," Lloyd notes.

Here comes the sun

Historically, developing nations with unreliable electricity supplies have used kerosene and gas-fuelled absorption refrigerators to store their vaccines. But these devices are rife with problems: kerosene-fuelled fridges are incapable of operating a thermostat, and therefore controlling the temperature of the vaccines, while their gas-fuelled counterparts suffer from extreme unreliability in terms of both supplies and distribution networks.

"We've learned to live with absorption refrigerators, but solar refrigerators are the likely future where there is no good supply of electricity," Lloyd says.

Solar-powered refrigerators are better controlled than absorption refrigerators, which use huge amounts of fuel and are inefficient.

"Electrical compression refrigeration is much more efficient, uses less energy and is less expensive," he adds. "The other enormous advantage is that you don't have to pay for fuel. The maintenance intervals (every 36 months for major maintenance and every 12 months for minor maintenance) are also dramatically different from absorption refrigerators that need attention every day."

Sounds like a win-win situation; however, the batteries needed for solar refrigeration have not reached the level of reliability or long life that makes them feasible in countries where electricity is not available in all areas of rural infrastructure. They're also prohibitively expensive.

Optimize has been working on a project called Solar Chill, a multilateral programme with members including the World Bank, to develop battery-free solar cooling technology to replace the battery-powered options.

"We've now got three solar battery-free refrigerator options," says Lloyd, adding that there is one problem. "The process of installation is crucial; it's got to be done properly or health workers don't understand how to use the solar equipment and they fill it up with bottles of water or try to freeze vaccines when they shouldn't."

With installation a challenge that can certainly be overcome, solar refrigeration is emerging as the preferred option for areas with unreliable supplies of electricity.

The security of your vaccines is our expertise.

The Pallet Shipper Frizbox® was designed to help safely transport large volumes of temperature-sensitive products throughout the world. 10 years after its creation, the effectiveness of Pallet Shipper Frizbox® is now adopted by most major pharmaceutical companies.

Sofrigam
www.sofrigam.com
Refrigerating qualified packaging

Copyright: Peter Arndt



“Project Optimize has been working on a project called Solar Chill, a multilateral programme with members including the World Bank, to develop battery-free solar cooling technology.”

Passive cooling

Passive cooling technologies are developing rapidly in four areas: 90-day cold-life containers, mobile passive cooling, super-long life ice-lined refrigerators and phase change materials.

“Passive cooling containers are pretty exciting,” Lloyd says. “There is one fairly revolutionary technology that has a 90-day cold life, which is excellent for small, remote health centres.”

As this technology has the full backing of the Bill & Melinda Gates Foundation, it is not facing any resource shortages and will be tested throughout 2012 in Senegal.

In a related development, mobile passive cooling rolling containers can now store 100-1,000l of vaccines, as opposed to the 19l boxes that had been commonly used.

“They’re much more compact for large quantities of vaccines than the small boxes, which means they allow more additional supplies such as drugs to travel with the vaccines,” says Lloyd. “This is an example of a technology that isn’t new – it’s been used for cooling fruit and keeping meals hot in factories.”

Optimize is also looking at moving vaccines at a local level with the use of phase-change materials in transport containers.

“These are very much the future of passive cooling in the cold chain,” Lloyd notes. “They change at 5°C so they’re not capable of freezing vaccines, which is excellent. We’re also looking at the possibility of using these packs to stabilise the temperature in domestic fridges, which are widely used in developing countries to store vaccines.”

Lloyd is keen to mention super-long life ice-lined refrigerators. “This is going to be a tremendous technology,” he says. “The latest development in ice-lined refrigerators can survive on just four hours of electricity in 24. It has

continuous stable running and the cooling is passive most of the time.”

Unfortunately, this cooling equipment is mainly produced in the developed world and is expensive compared with the domestic refrigerators that many healthcare facilities are making do with.

From zero to hero

The concept of net zero energy means that taking into account the energy generated and the energy used, zero energy is actually consumed, and a question increasingly being asked by Project Optimize is: “Can we pay for the electricity in the stores, including refrigerators, computers and lighting, as well as the energy used for transporting vaccines, through the use of solar energy?” >>

Zenatek Tracking System

Our system:
a new concept of monitoring container traffic



Going beyond the known limits

www.zenatek.eu – info@zenatek.eu

Driving healthcare

Exclusive transport services for the pharmaceutical industry

FARMA <25°

Parcel transport deliveries below +25°C.

FRIO FARMA

Parcel transport deliveries between +2 and +8°C.

Quality guaranteed. More than 20 years of experience in COLD CHAIN management.

Collaborating member:



Integra2

integra2@integra2.es • www.integra2.es
GDP's video: <http://farma25.integra2.es>



Grupo Logista

Fuel-guzzling four-wheel drives and diesel vehicles are widely used to distribute vaccines across developing countries, so the team at Project Optimize decided to replace 82% of these with the best of the electric delivery vehicles coming off the European production lines.

"It's an exciting idea, but it's a little bit compromised in two areas: the state of development of electric vehicles and the state of the buildings in the countries," says Lloyd. "We're crossing our fingers that the vehicles are big enough for our purpose and we're aiming to eventually have architecturally designed standardised stores to minimise the amount of energy used in the buildings. We will then be able to achieve some quite important economies."

Getting the word out

Each technology or system covered here is years away from widespread implementation. This is for two key reasons, according to Lloyd. One – there is no global database describing the market for cold chain equipment, meaning it is difficult to access venture capital funding. And two – managers in developing countries are not educated enough to navigate between the many options available. These barriers need to be overcome if any of the programmes mentioned in this article are to be successfully scaled up.

"We're partly involved in this [with the project's 'getting the message out' set of activities], but we're also planning to set up a grant system within the Gates Foundation in the US to tackle some of the things we haven't been able to tackle directly within the Optimize project," he explains. "It's one thing to have a vision and it's another thing to have an innovative idea. But it's quite another thing altogether to have a vision, an innovative idea and an idea of how the vision can be realised."

With the vision such a valuable one, the important thing at this point is to get as many stakeholders on board as possible, so that the delivery systems associated with vaccines can reach the standards of the vaccines themselves and increase global immunisation rates to a level the industry can be proud of. ■

“Solar refrigeration is emerging as the preferred option for areas with unreliable supplies of electricity.”