



TEMPERATURE- CONTROLLED LOGISTICS: *Why Now?*



IFC

**International
Finance Corporation**
WORLD BANK GROUP

Creating Markets, Creating Opportunities

Temperature-Controlled Logistics (TCL): A Key Ingredient in Global Health and Prosperity

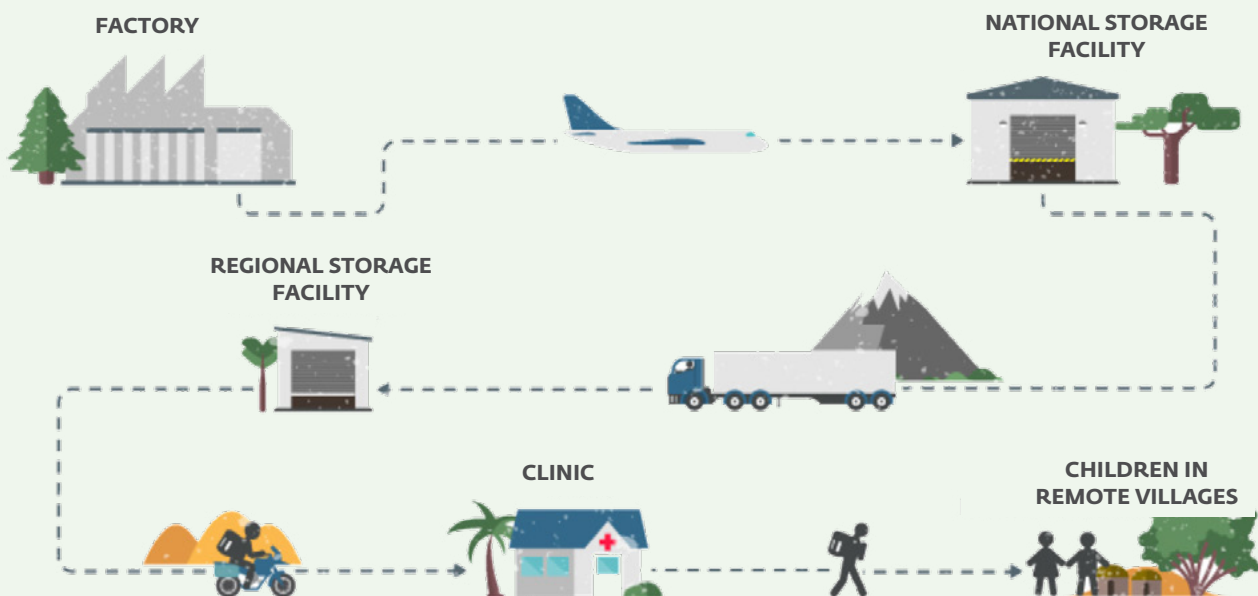
Most people don't give much thought to the issue of food quietly spoiling in warehouses and trucks around the world. Yet the cost of such waste is massive, whether it is measured in economic, social or environmental terms. If food wastage was a country, it would rank third in terms of carbon emissions. Food waste is just one of the costs of inadequate temperature-controlled logistics (TCL) infrastructure around the world. Each of the Covid-19 vaccines currently in development requires careful temperature control during all stages of shipment, storage and distribution. Every year, millions of vaccines and other essential medications fail to reach the people who need them for a simple reason: these products need to be kept at a stable, and in some cases very cold temperature all the way from the factory to the patient's body. Temperature-controlled logistics are a crucial but often under-recognized tool for improving food security, ensuring economic prosperity, limiting carbon emissions and guaranteeing public health.

The lack of cold storage and refrigerated transport in the medical sector alone contributes to 1.5 million vaccine-preventable deaths among children, every year. Roughly half of annual global food production is wasted. Food waste represents a loss of valuable resources such as labor, energy, water and land. Waste also dramatically reduces the food available to nourish the world's growing population. Food loss and wastage have a significant carbon footprint, resulting in approximately 4.4 gigatons equivalent of carbon dioxide emissions per year.

The current Covid-19 pandemic will most likely place further demands on TCL infrastructure around the world. In order to maintain the stability of Covid-19 vaccines, they will need to be transported and stored at low temperatures from the factory to the point of use. At this moment, there are more than 40 coronavirus vaccine candidates undergoing clinical trials and more than 150 in pre-clinical evaluation. Health officials have indicated that most vaccines will likely need to be maintained between 2° and 8°C (36° to 46°F) throughout the shipping process to stay potent, with some vaccines

The long road to vaccination

Vaccines must be kept at a low, stable temperature all the way from factory to some of the most remote places on earth



Source: MSF

requiring temperatures well below 0°C (32°F). The two Covid-19 vaccine candidates for which successful early trials were recently announced have different cold storage and distribution requirements. Moderna's vaccine can be shipped and stored for up to six months at a temperature of -20°C (-4°F). The Moderna vaccine lasts up to 30 days when kept at a standard refrigerator temperature of 2° to 8°C (36° to 46°F), and up to 12 hours at room temperature. Pfizer's vaccine can be transported and stored for up to 6 months at -70°C (-94°F) and for up to five days at refrigerator temperature.

In emerging markets, there are likely to be significant gaps, given the much larger order of magnitude of the proposed vaccination effort over a shorter period of time compared to existing vaccines. Establishing and maintaining the cold chain for the Covid-19 vaccine is expected to be a challenge even for rich countries. In developing countries, some of which are unable to properly handle the cold chain needs for existing vaccinations, the task will be even more difficult. Developing

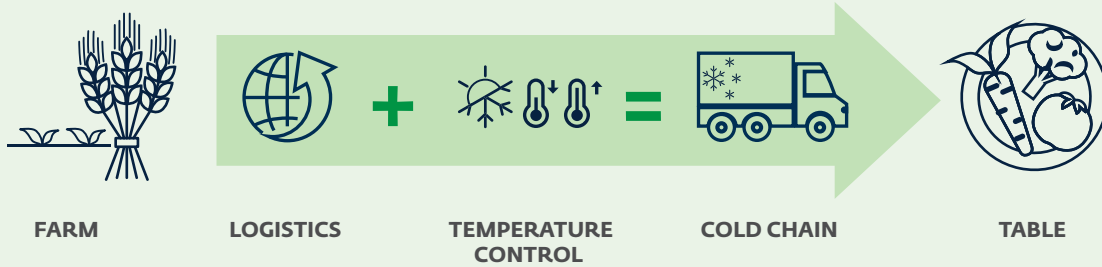
countries often lack the cooling infrastructure and equipment, such as refrigerated storage and trucks, required to maintain large quantities of a vaccine at a constant low temperature through final delivery. Deficiencies in electricity supply can make refrigeration unreliable. Creating the capacity to deliver the Covid-19 vaccine will require investments in both TCL infrastructure and electricity generation. Most governments do not have the capacity to plan investment projects in TCL, while private-sector entities have developed technologies and business models that could potentially be deployed in emerging markets.

What Are the Components of Temperature-Controlled Logistics?

TCL is used for the storage and shipment of perishable essentials such as seafood, vegetables and pharmaceuticals, as well as for consumer goods like cosmetics. TCL, also known as cold chain logistics, refers to the handling of these products within a low temperature environment in an unbroken chain at all stages following harvest or production. Collection, packing, processing, storage, transport and distribution are all crucial parts of a comprehensive TCL strategy. For food products, the maintenance of the cold chain is critical all the way from the farm to the table.

The recent promising announcements regarding the effectiveness of the leading vaccines will not translate into results on the ground without additional investments in TCL infrastructure around the world.

Temperature-Controlled Logistics



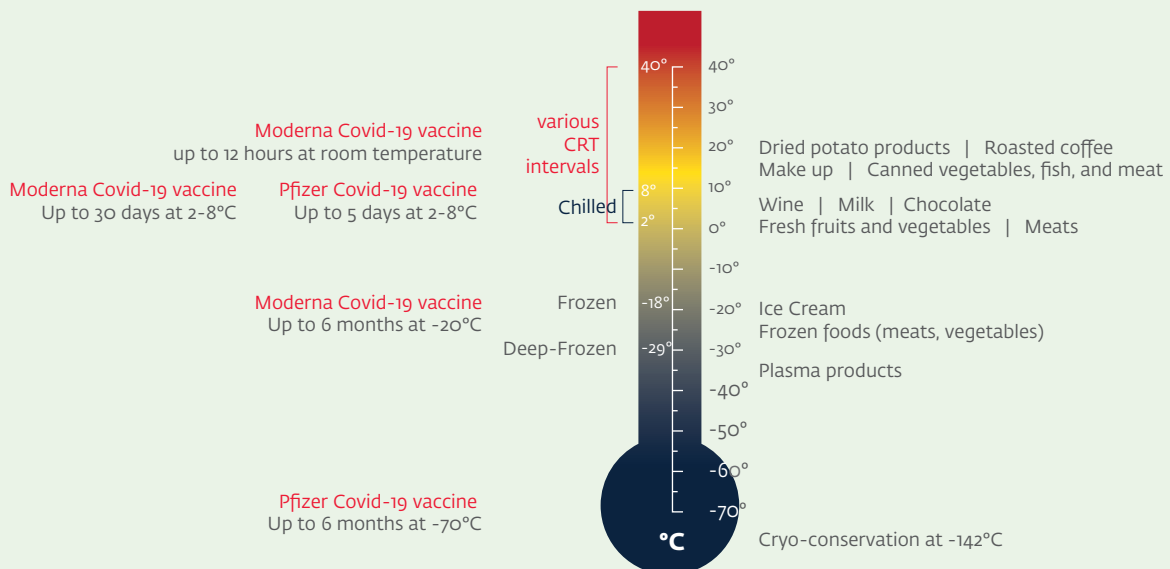
Each product has different characteristics and therefore places different requirements on its treatment in the supply chain. For example, ice cream must remain frozen, while fresh salad maintains its quality best when kept chilled. Medical products, vaccines and other consumer goods can have widely variable temperature requirements.

CRT=CONTROLLED ROOM TEMPERATURE

Designing or implementing a complete

temperature-controlled logistics chain is not an easy feat. Whether an agricultural producer is bringing fruit to market, or a pharmaceutical company is delivering vaccines to a hospital, the team in charge of the TCL process faces numerous challenges. They must understand the science behind the perishability of a product, identify the technology and equipment to be used, and carefully monitor the process of moving the product to market.

Ambient Temperature Requirements of Commonly-Transported Products



How is IFC Working to Create New Private Investment Opportunities in Temperature-Controlled Logistics?

IFC's new strategy calls for early engagement with both public and private entities to develop new investment opportunities. This includes all the pre-investment work required to make a deal happen, including analysis of market development barriers and opportunities,

identification of enabling reforms and project preparation. IFC's current TCL engagements illustrate a comprehensive range of pre-investment supports such as market diagnostics, industry surveys, and project scoping.

This five-part Knowledge Series illustrates IFC's approach to developing new private investments in TCL and discusses the importance of the sector for development and the growing investment opportunity that it represents in emerging markets.

A series of notes on new investment opportunities in Temperature-Controlled Logistics

- **An Essential Tool for Growth and Health**
- **Emerging Market Opportunities**
- **Piloting Investments**
- **Learning from Experience**

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