

IMPACT

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RESPONDING TO THE COVID-19 CRISIS IN MONGOLIA WITH A CLIMATE-FRIENDLY CENTRAL VACCINE STORE

Mongolia's central vaccine storage facility in Ulaanbaatar did not have the capacity or capability to accommodate incoming COVID-19 vaccines, some of which required storage at very cold temperatures, and other future routine vaccine storage demands. The government turned necessity into an opportunity to upgrade the country's vaccine cold chain infrastructure with a new, reliable, energy-efficient, solar-ready, earthquake resistant, state-of-the-art central vaccine storage facility with four times the capacity. The facility was financed by the World Bank through the COVID-19 Emergency Response and Health System Preparedness Project, with ESMAP providing in-kind technical expertise working with UNICEF as the implementing agency. The new central vaccine storage facility, designed and subsequently constructed in just over three months, was inaugurated in August 2021 by Prime Minister L. Oyun-Erdene. It is poised to make a real difference for the health and well-being of the Mongolian people during the COVID-19 crisis, and beyond, and ensures reliable and safe storage for life-saving vaccines—while limiting greenhouse gases and local air pollution as well as lowering operating expenditures.

MONGOLIA'S CENTRAL STORAGE INSUFFICIENT TO ACCOMMODATE INCOMING COVID-19 VACCINES

In March 2020, as the world was hit by a global pandemic due to COVID-19, the Mongolian government knew that ensuring adequate, safe, and reliable cold storage would be critical for receiving vaccines when they became available. Vaccines must be stored at appropriate temperatures from the time they are manufactured until administered to ensure their safety. If the cold chain, a temperature-controlled supply chain, which includes refrigeration, storage, and distribution activities, is not properly maintained, vaccine potency may be lost, resulting in wasted vaccines, with financial as well as health implications.

At that time, Mongolia's central vaccine store could hold 600,000 doses of vaccines and was already inadequate to store routine childhood vaccines. Evidently, it did not have enough capacity for COVID-19 vaccines, nor could it maintain the ultra-low temperatures of -20°C to -80°C (-4°F to -112°F) needed to store mRNA COVID-19 vaccines such as those from Pfizer and Moderna. With vaccines being costly and limited in availa-

bility, especially at the onset of the pandemic when they were difficult to access, each one was especially precious to save lives.

Mongolia took a proactive stance. Because it's harder—and costlier—to introduce climate-smart features in buildings through retrofits than to build green from the start, the government saw the situation as an opportunity to increase the vaccine storage capacity with a high-quality, technologically advanced, and energy-efficient facility. This was combined with plans to ensure adequate maintenance and training to sustain the proper functioning of the facility and its energy-efficient performance over time.

With vaccines slated to arrive, the decision was made in April 2021 to build a new environmentally friendly central cold storage facility; the project needed to move quickly ahead of Mongolia's cold winter, which would delay construction.

"We were in urgent need of a comprehensive solution (to store and deploy vaccines) with the influx of COVID-19 vaccines for most of the adult population," said Dr. O. Dashpagma, head of Mongolia's vaccination unit of the National Center for Communicable Diseases.

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"On a technical level, ESMAP brought energy and climate expertise to complement UNICEF—there were discussions on low global warming potential (GWP) refrigerants, energy efficiency design, the power requirements for the vaccine storage, the economic benefits of solarizing the facility and adjusting the design to ensure a future smooth transition to solar-energy. That wouldn't have happened without the contribution of ESMAP."

*Anna Wielogorska
Lead Procurement Specialist and Co-Task Team Leader, World Bank*

THE WORLD BANK MONGOLIA COVID-19 EMERGENCY RESPONSE AND HEALTH SYSTEM PREPAREDNESS PROJECT

In April 2020, the World Bank approved \$26.9 million for the [Mongolia COVID-19 Emergency Response and Health System Preparedness Project](#) to meet emergency needs in the face of the pandemic and to better prepare for future health crises. The project addressed some of the immediate needs in response to COVID-19 such as the purchase of personal protective equipment, medical equipment, and other supplies, as well as building COVID-19 diagnostic and treatment capacity in Ulaanbaatar and all provinces.

In response to the government's request, the World Bank approved an additional financing of \$50.7 million in February 2021. The bulk of this financing was to be dedicated to support vaccine purchases and deployment, and a smaller share of the financing was allocated to help strengthen the country's health system. This enabled financing the upgrade of the cold chain storage infrastructure for vaccines; \$2.9 million was allocated to purchase and install cold chain equipment (CCE) at the central facility and vaccination sites throughout the country and \$2 million was allocated to design and construct the central vaccine store. Training was also provided on CCE operation.

ESMAP'S ROLE IN DEPLOYING RELIABLE AND CLIMATE-FRIENDLY COLD CHAINS TO DELIVER VACCINES

At the onset of the COVID-19 pandemic, ESMAP quickly reoriented its activities and shifted priorities to help mobilize technical and financial resources to support vaccine deployment so that energy would not be a constraint and sustainability features would be incorporated from the beginning of the vaccine rollout. This effectively resulted in a reshaping of the focus of its Efficient, Clean Cooling Program, which prioritized financial and technical assistance to work with the World Bank's Health teams and client countries to help integrate reliable and climate-friendly (i.e., energy efficient, using low greenhouse gas emitting refrigerants, and relying on renewable energy as much as possible) cold chains into the World Bank's COVID-19 responses.

One pillar of ESMAP's engagement in the COVID-19 response was its participation in the World Bank's COVID-19 Vaccine Delivery Taskforce, where it collaborated with key internal and external stakeholders, including WHO, UNICEF, and Gavi on the deployment of reliable and climate-friendly cold chains. Another key aspect of this engagement was the allocation of ESMAP grants. In 2021, ESMAP's Efficient, Clean Cooling



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Program allocated a total of \$9 million to help support COVID-19 response projects in 11 countries—mostly vulnerable countries with limited IDA financing envelopes. ESMAP’s grant financing was allocated to Cabo Verde, Comoros, Ethiopia, Malawi, Niger, São Tomé, Somalia, South Sudan, Sudan, Zambia, and Zimbabwe to support activities strengthening vaccine cold chains and health infrastructure.

Leveraging its various knowledge products and sector expertise, the ESMAP team also provided in-kind technical and advisory cross support to several World Bank Health operational teams to support COVID-19 response projects focused on reliable and climate-friendly cold chains, namely in, Philippines, and Tunisia—in addition to Mongolia.

To support the Mongolia project, ESMAP was able to quickly assemble a core team of specialists to lend technical expertise to the project to inform the design of a new climate-smart central cold storage facility. The ESMAP team supported UNICEF, contracted by the government for this element of the project. In line with the time constraints of the project, the ESMAP team rapidly mobilized expertise in building efficiency, cooling, renewable energy, batteries, distribution, procurement, and cold chain equipment for vaccines, to assess the various options—technical and financial—of developing the vaccine storage facility in a climate-friendly manner. Additionally,

insights gained from ESMAP’s engagement with the World Bank’s COVID-19 Vaccine Delivery Taskforce and partner organizations such as WHO, UNICEF, and Gavi informed the technical advice provided.

This demonstration of agility highlights ESMAP’s ability to shift gears to orient its resources and expertise to address new challenges and take advantage of new opportunities. The program swiftly adapted to a working environment that cut across sectors to help put forward a robust COVID-19 response and proved to be instrumental in designing an energy-efficient vaccine storage facility using more climate-friendly refrigerants, as well as sowing the seeds for the facility to be solar-ready in a future phase of investments.

CLOSE COLLABORATION & PARTNERSHIP WERE KEY TO IMPLEMENTING THE VACCINE STORAGE FACILITY

The new Mongolia central vaccine cold storage facility constitutes a good example of World Bank-ESMAP-UNICEF collaboration; team members in these organizations worked effectively and efficiently together in support of the project as part of the country’s COVID-19 response. Throughout the design stage, the World Bank, ESMAP, and UNICEF teams were in close and continuous col-



Image Source: ©UNICEF

climate-friendly central vaccine store that has driven Mongolia's response to the COVID-19 crisis. All the pieces fell in place at the right time. We are hopeful that Mongolia's experience will pave the way for other countries to upgrade their cold chain infrastructure in a similar manner," said Rahul Srinivasan, an ESMAP Energy Specialist and COVID-19 Global Vaccine Delivery Taskforce member with the World Bank.

ENERGY EFFICIENCY FEATURES OF THE CENTRAL VACCINE STORE

Mongolia's new central vaccine facility is equipped with over 10,000 pieces of energy-efficient, modern equipment. This includes cold rooms ranging from 20–40 m², voltage stabilizers for cold and freezer rooms, different capacity refrigerators, and freezers complete with full sets of parts and supplies. The cold chain equipment covers temperature settings such as +2 to +8°C, -15 to -25°C, and -70 to -80°C.

The energy efficiency and specific cooling requirements of the new facility are ensured through both passive (e.g., number of apertures in building minimized, air curtains and airlocks used at all entrances, proximity sensors to control lighting loads) and active measures (e.g., energy-efficient heat pumps). Moreover, the ESMAP team ensured that careful consideration was given to the procurement and installation of refrigeration equipment using low global warming potential (GWP) refrigerants (R449a, R452a)—further lowering the greenhouse gas footprint of the facility. The climate-smart features of the facility are a significant improvement over the original facility design, making it a cutting-edge example of sustainability that other countries may want to emulate.

The ESMAP team and its partners explored and assessed options to solarize the facility—which would render it completely climate neutral. Despite freezing winters, Mongolia's capital Ulaanbaatar has bountiful solar radiation, with an annual average of 2,800 hours of sunshine. While it was not possible to solarize the vaccine store because of timing and financial constraints, the World Bank-UNICEF-ESMAP team ensured the facility be designed so that it is solar-ready for the next phase of investments. In fact, ESMAP supported this "solar readiness" by providing guidance on the positioning of the solar panels for future placement.

laboration and equally committed to maximizing climate-smart dimensions, identifying different options, and assessing implications to come up with the final plans for the facility that were proposed to and ultimately adopted by the Mongolian government.

Specifically, ESMAP provided UNICEF with technical feedback on the facility's specifications and its energy efficiency features as well as assessments of the economic benefits of solarizing the vaccine store, including the payback period. Based on economic and environmental considerations, the ESMAP team also recommended alternate cold chain equipment (walk-in cold rooms and freezer rooms) to the initially proposed option. Additionally, the ESMAP team provided knowledge resources to facilitate sustainable disposal of old cold chain equipment.

"We made sure there was energy expertise to guide UNICEF, the implementing partner. At ESMAP, we quickly mobilized expertise to provide technical guidance and recommendations for the design of a cutting-edge, energy-efficient, and



Image Source: ©UNICEF

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"With this new facility, we are proud to say that Mongolia's vaccine storage and cold chain capacity has entered a new stage. Every single vaccination unit in the country...is able to receive properly stored vaccines from the central storage, ensuring that all people, including those living in remote areas, are vaccinated."

Dr. Altanchimeg Samdan

Worked in NCCD handling vaccine storage for over 20 years

INAUGURATION OF THE NEW CENTRAL VACCINE COLD STORAGE FACILITY

On August 26, 2021, the World Bank's COVID-19 response operations in Mongolia reached a major milestone: the opening of the new central vaccine storage facility by Prime Minister L. Oyun-Erdene. The opening ceremony, organized by the Ministry of Health and UNICEF, was attended by a number of dignitaries, including the Deputy Prime Minister, the Minister of Health, and UNICEF's Deputy Resident Representative.

Constructed in just over three months, the facility is a critical part of the country's overall health infrastructure. With four times the capacity of the old facility, it is capable of storing a minimum of 2–3 million doses of vaccines—including routine immunizations and COVID-19 vaccines requiring

ultra-cold storage. Thanks to this new central vaccine store, [Mongolia, as of March 2022, has administered roughly 5.5 million doses of COVID-19 vaccines](#)—enough to have vaccinated over two-thirds of the country's population with two doses and over a third with an additional booster dose, according to the World Health Organization in Mongolia.

LOOKING AHEAD

The Ministry of Finance and Ministry of Health are interested in moving to a second phase of the project to solarize the central vaccine store and exploring solarization and increased energy efficiency to make vaccine storage more sustainable at the local levels as well.



Image Source: ©World Bank

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It was great to see that our work was making a real difference for the survival prospects and well-being of the Mongolian people during this challenging time.

Andrei Mikhnev, World Bank Country Manager

Watch [this video](#) of doctors, nurses, and medical staff in Mongolia sharing their stories of fighting on the frontlines of the COVID-19 pandemic and how the World Bank's response has supported their emergency needs while also helping the country prepare for future health crises.

For questions, please contact: esmap@worldbank.org

ESMAP MISSION

The **Energy Sector Management Assistance Program** (ESMAP) is a partnership between the [World Bank](#) and [24 partners](#) to help low- and middle-income countries reduce poverty and boost growth through sustainable energy solutions. ESMAP's analytical and advisory services are fully integrated within the World Bank's country financing and policy dialogue in the energy sector. Through the World Bank Group (WBG), ESMAP works to accelerate the energy transition required to achieve Sustainable Development Goal 7 ([SDG7](#)) to ensure access to affordable, reliable, sustainable, and modern energy for all. It helps to shape WBG strategies and programs to achieve the [WBG Climate Action Plan](#) targets.