Application Form for Cold Chain Equipment Optimisation Platform support in 2018

Document Dated: November 2017

CCE Application Form	**Purpose of this document:** This application form must be completed in order to apply for support related to the CCE Optimisation Platform. Applicants are required to read the **Application guidelines** and **How to request new Gavi support** documents. Thereafter, applicants should complete this CCE Application Form and submit by email to proposals@gavi.org.
CCE TG 	**Resources to support completing this application form:** **Technology guide for equipment selection** for counties wishing to request CCE Optimisation Platform support is available here: www.gavi.org/support/hss/cold-chain-equipment-optimisation-platform/ **Extensive technical resources** relating to vaccine cold chain equipment management are available on TechNet-21: www.technet-21.org/en/resources/cold-chain-equipment-management
Weblinks and contact information: All application documents are available on the Gavi Apply for Cold Chain Equipment support webpage: http://www.gavi.org/support/process/apply/cceop/. For any questions regarding the application guidelines please contact countryportal@gavi.org or your Gavi Senior Country Manager (SCM).	

	Countries are informed that based on post IRC recommendations, **final approved amounts may be different** from what countries have requested. **This final approved amount will be dependent on the availability of funding.** **Gavi will respect countries' equipment selection. However, countries could also receive their 2nd or 3rd preference based on their selection in the budget.**

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PART A: APPLICANT INFORMATION

1. Applicant information		
Country	Republic of Zambia	
Date	17 October2018	
Contact name	Dr Francis Dien Mwansa	
Email address	fmdien@gmail.com	
Phone number	+260977700083	
Total funding requested from CCE Optimisation Platform **(US $)**	*This should correspond exactly to the budget requested in the embedded template.* USD 11,588,321	
Does your country have an approved Gavi HSS support on-going?	Yes ☒	No ☐
	*Indicate the anticipated **final year** of the HSS: April 2021*	
Proposed CCE Optimisation Platform **support start date** *(please be informed the actual start date should be at least 8-10 months from application date):*	*Indicate the month and year of the planned start date of the support, based on the strategic deployment plan:* October 2019	
Proposed CCE Optimisation Platform support end date:	*Indicate the month and year of the planned end date of the support, based on the strategic deployment plan:* October 2023	
Signatures *Include signed (and official) CCE Optimisation Platform application endorsement by:* *a) Minister of Health and Minister of Finance (or delegated authorities)* *b) Members of the Coordination Forum (HSCC/ICC or equivalent body)*	*We the undersigned, affirm the objectives and activities of the Gavi CCE Optimisation Platform proposal are fully aligned with the national health strategic plan (or equivalent) and that the funds for implementing all activities, including domestic funds and any needed joint investment, will be included in the annual budget of the Ministry of Health:* **Minister of Health (or delegated authority) Minister of Finance (or delegated authority)** NB: The country has submitted this as a separate sheet signed by the two ministers of health and finance.	

PART B: MANDATORY ATTACHMENTS: NATIONAL STRATEGIES AND PLANS

This section provides a list of national strategies, plans and documents relevant to supply chain and requested support, which must be attached as part of the application.

☆	All documents listed in the table below are **mandatory**, must be **attached** to your application, and they must be **final** and **dated**. Only **complete applications** will be assessed.

2. Mandatory attachments					
No.	**Strategy / Plan / Document**	**Attached Yes/No**	**Final version (dated)**	**Duration**	**Comments**
1	Hon. Minister of Health Signature for CCEOP Application_10Sept18	Yes	10 September 2018		
1b	Hon. Minister of Finance Signature for CCEOP Application_17Oct18	Yes	17 October 2018		
2	ICC Q3 2018 Minutes_30Aug18 *(Minutes of the Coordination Forum meeting endorsing the proposal[1])*	Yes	30 August 2018		
2b	ICC Signatures for CCEOP Endorsement	Yes	30 August 2018		
3	Zambia National Health Strategic Plan 2017-2021_1Jan17	Yes	1 January 2017	2017-2021	
4	Comprehensive Multi-Year Plan (cMYP)	Yes	31 March 2018	2017-2021	
5	Zambia 2015 EVMA Report_Oct15	Yes	October 2015		
5b	Zambia 2011 EVMA Report_28Aug11	Yes	28 August 2011		
6	EVM Improvement Plan_15June18	Yes	15 June 2018		
7	EVM Annual Workplan and Progress Report on EVM Improvement Plan_27July18 [2]	Yes	27 July 2018		
8	WHO_CCE_InventoryGapAnalysis_Zambia_16Oct18	Yes	16 October 2018		
9	Inventory Report and Facilities Segmentation_16Oct18	Yes	16 October 2018		
10	Zambia Comprehensive Document on CCE Needs • Chapter 1: Cold Chain Rehabilitation and Expansion Plan • Chapter 2: Projected Coverage and Equity Improvements • Chapter 3: Operational Deployment Plan, including deviation plan • Chapter 4: Equipment Selection • Chapter 5: Decommissioning Report	1.Yes 2. Yes 3. Yes 4. Yes 5. Yes	16 October 2018		
11	Zambia Cold Chain Equipment Maintenance Plan 2018_12Oct18	Yes	12 October 2018	Ongoing	
12	Proof of Status for CCE Tariff Exemptions Waiver_Signed_22.10.14	Yes	22 October 2014	Ongoing	
13	Zambia Gavi FCE Annual report 2017-2018_10July18	Yes	10 July 2018	2017-19	

[1] In the case of HSS and CCE Optimisation Platform requests, minutes must reflect that both were discussed and endorsed.
[2] The EVM IP and annual work plan progress report must have been updated within three (3) months before applying for Platform support.

2. Mandatory attachments					
No.	**Strategy / Plan / Document**	**Attached Yes/No**	**Final version (dated)**	**Duration**	**Comments**
14	ICC for RMNCAHN TOR_1Feb18	Yes	1 February 2018	Ongoing	
15	ICC Q1 2018 Minutes_8Feb18	Yes	8 February 2018	N/A	
16	ICC Q2 2018 Minutes_9May18	Yes	9 May 2018	N/A	
17	ELMA Cold Chain Proposal Zambia_09.2013	Yes	Sept 2013	2014-2015	
18	JICA Cold Chain Proposal Zambia 04.2013 Final	Yes	April 2013	2013-2015	
19	Zambia_CCEOP_Budget_17Oct18	Yes	17 October 2018	2019-2022	
20	ZAMBIA - 2017 MOH_WHO_UNICEF_JRF_30.3.18	Yes	30 March 2018	2017	
21	EPI-OPT_Final Draft_01.12.17	Yes	1 Dec 2017	Ongoing	
22	Solar Resource Mapping in Zambia, Solar Modelling Report_Nov14	Yes	November 2014		
23	2017 JRF for CCEOP Prioritisation_24July18	Yes	24 July 2018	2017	
24	Zambia 7th National Development Plan 2017-2021_07.06.17	Yes	7 June 2017	2017-2021	
25	Zambia Gavi HSS Proposal_12Oct15	Yes	12 October 2015	2018-2021	
26	PQS Devices Catalogue_14May12	Yes	14 May 2012		
27	Zambia: Equity of Immunization_Aug18	Yes	August 2018		
28	Zambia Vaccine Cold Chain Scale-up Strategy_8June11	Yes	8 June 2011		
29	Zambia Vaccine Cold Chain Scale-Up Strategy Phase 2_22Nov11	Yes	22 November 2011		
30	CCEOP Operational Deployment Plan_Zambia_2019Priority1_17Oct18	Yes	17October 2018		
30b	CCEOP Operational Deployment Plan_Zambia_2019Priority2_17Oct18	Yes	17October 2018		
30c	CCEOP Operational Deployment Plan_Zambia_2020Priority1_17Oct18	Yes	17October 2018		
30d	CCEOP Operational Deployment Plan_Zambia_2020Priority2_17Oct18	Yes	17October 2018		
30e	CCEOP Operational Deployment Plan_Zambia_2021_17Oct18	Yes	17October 2018		
30f	CCEOP Operational Deployment Plan_Zambia_2022_17Oct18	Yes	17 October 2018		
31	Data Validation Report_12Oct18	Yes	12 October 2018		
32	Zambia MOH Prime-Time Contract_5Sept18	Yes	10 September 2018		

3. How do the above strategies, plans and documents inform the CCE Optimisation Platform support request (initial support and scale-up support)? *(Maximum 1 page)*

Zambia has a surface area of 752,610 km² and an estimated population of 17 million (worldbank.org). This translates into a population density of 22.6 persons per km² or approximately 4.5 children under 5 per km². Zambia's estimated population is 16,887,720 (2018 Central Statistics Office estimate), with urbanisation of 42%, whilst Sub-Saharan Africa is about 39% (worldbank.org). This indicates a decrease in rural population density when population density is already low.

Over the past 5 years, the MoH has introduced three new vaccines (rotavirus, pneumococcal conjugate and measles second dose), switched from trivalent oral polio vaccine to bivalent oral polio vaccine, switched from PCV-10 to PCV-13, switched from Measles to Measles Rubella and introduced IPV (Zambia National Health Strategic Plan 2017-2021_1Jan17). To accommodate the expanded cold chain storage capacity required for these new vaccine introductions and to further strengthen EPI in Zambia, the Zambia Vaccine Cold Chain Scale-up Strategy (Zambia Vaccine Cold Chain Scale-up Strategy_8Jun11; Zambia Vaccine Scale-Up Strategy Phase 2_22Nov11) was developed. This strategy catalysed cold chain expansion and enabled government and partners to mobilise resources and procure more than 2,000 refrigerators (ELMA Cold Chain Proposal Zambia_09.2013; JICA Cold Chain Proposal Zambia 04.2013 Final) between 2012-16.

For this application the Cold Chain Equipment Inventory (CCEI) was conducted in end 2017 and updated in 2018 and contains around 2,688 sites and around 2,770 Cold Chain Equipment (WHO_CCE_InventoryGapAnalysis_Zambia _Final15Oct18.

The table below provide summary cold chain equipment need for the expansion and replacement plan.

Table 1 Refrigerator Type and Year

Year	Type	Electric	Solar	Freezer	Total
Y1	Unequipped + severe capacity gaps, facilities over 5,000 total population	270	354	44	668
Y2	Unequipped + severe capacity gaps, facilities under 5,000 total population	187	605	-	792
Y3	Increase capacity for sites with insufficient CCE capacity & replace old, non-repairable & non-PQS	184	288	32	504
Y4	Replace old, non-repairable & non-PQS	93	4	37	134
TOTAL		**734**	**1,251**	**113**	**2,098**

The total budget inclusive 6% additional buffer is $11,588,321, with $5,794,160 (50%) coming from Gavi as part of co-financing. As the country is expected to contribution for procurement service (8.5%), the total Government contribution is $6,286,664.

The Government of Zambia has actively added new health facilities in communities to improve health services. This initiative involves the construction of 650 new health facilities across the country (Zambia 7th National Development Plan 2017-2021_07.06.17). Additionally, the 2017-2021 Zambia Immunisation Comprehensive Multi-Year Plan (cMYP) also outlines an ambitious vision for the country—*A Zambia in which all individuals and communities enjoy lives free from vaccine-preventable diseases (*Zambia cMYP 2017-2021_Revised10Sept18).[3] This ambition, new health facilities and gaps in the current cold chain create the need for new refrigerators to close the gap and bring immunisation services closer to those in need. Therefore, the focus of this application is on

[3] Zambia Immunisation Comprehensive Multi-Year Plan (cMYP), 2017-21

extending cold chain storage capacity into new health facilities, as well as replacing old technology and non-functioning equipment. The process of standardisation of refrigerator models, which was started with the Vaccine Cold Chain Scale-up Strategy, provided the anticipated simplification of technical support and spares management and it is the wish of the MoH to continue this strategy with this application as far as possible.

The country has also developed CCE maintenance plan to ensure national and sub-national levels understand the importance of maintenance and during trainings and deployment this maintenance plan will be emphasised as a matter of critical importance to protect the investment in vaccines, as well as equipment. Maintenance of cold chain is managed by local technicians employed by the ministry of Health. These are carders with either technical or Environmental background and have undergone in house orientation in cold chain equipment maintenance, repair and installation organised by the Ministry of Heath .The Central level keeps stock of essential spares and supports lowers levels whenever need arises. For more details refer to the maintenance plan in the mandatory attachment documents.

Other factors contributing to decision making in this proposal include a 2014 report on solar energy conducted by the World Bank Group and the Energy Sector Management Assistance Programme entitled, *Solar Resource Mapping in Zambia, Solar Modelling Report*. It clearly shows that throughout Zambia, twelve months of the year, the Global Horizontal Irradiation exceeds the minimum requirement of 3.5 kWh/m²/day set by B-Medical (Solar Resource Mapping in Zambia, Solar Modelling Report_Nov14t, p45; PQS Devices Catalogue_14May12). The Vaccine Cold Chain Scale-up Strategy also provided for extensive technician and health worker training, together with offering substantial experience in the installation of both electrical and solar powered refrigerators. This created a solid base for the technical support for cold chain equipment in Zambia. The CCEOP bundling of equipment, together with installation and training by suppliers, will further strengthen this already strong base complementing the EPI secretariat.

In a 2018 Gavi funded study on coverage and equity in Zambia (Zambia: Equity of Immunisation_Aug18, Nikoloski et al), two indicators linked to equity were identified: rural populations by distance and peri-urban areas. When coverage and equity improvements are considered in terms of the CCEOP in Zambia, the low density of rural populations and the high level of urbanisation, leads to the conclusion that remote facilities may help close the equity gap, but risk widening the coverage gap. It would not be cost-effective to provide a health facility a refrigerator because it was remotely located at the expense of a non-remote health facility that could give greater coverage improvement. Therefore, a balance between the two is required. This proposal therefore prioritises sites according to both indicators for placement, i.e. rural health facilities by distance from the nearest supply point and peri-urban health facilities, and in both categories sites with a coverage reported in the last Joint Reporting Form (JRF) below 90% (ZAMBIA – 2017 MOH_WHO_UNICEF_JRF_03.3.18; 2017 JRF for CCEOP Prioritisation_24July18[9]).

4. Describe how supply chain stakeholders (including Coordination Forum (ICC/HSCC or equivalent), government, NLWG, NITAG, key donors, partners, CSOs and key implementers) have been involved in the application development including if the quorum at the endorsing meeting was met

Does the country have a permanent and functioning National Logistics Working Group (NWLG)? If No, does the country plan to establish one and when?

Gavi and its Alliance partners encourage the establishment of such group that coordinates Government and non-Government partners 'activities and investments related to the health supply chain including immunization.

Were any of Gavi's requirements to ensure basic functionality of Coordination Forums not met? Then please describe the reasons and the approach to address this (refer to section 5.2 of the General Guidelines for the requirements) *(Maximum 1 page)*

The Inter-agency Coordinating Committee (ICC) for Reproductive, Maternal, Neonatal, Child and Adolescent Health and Nutrition (RMNCAH-N) acts as advisory committee to the Ministry of Health on all donor funded projects and for departmental updates and guidance.

EPI falls under the Directorate of Public Health and Research and has various Technical Working Groups and sub-committees to guide and provide oversight to the programme. The EPI is managed as a committee of the Child Health and Nutrition Technical Working Group, and includes Government, bi- and multi-laterals, Non-Governmental Organisations (NGOs), universities and research institutions, donors, implementers, Civil Society Organisations (CSOs) and other partners. (ICC for RMNCAHN TOR_1Feb18). Under this EPI Committee is the Logistics and Supply and Cold Chain Sub-Committee, as well as Monitoring and Evaluation, Service Delivery, and Communication and Advocacy Sub-Committees. Both the EPI committee and the Logistics sub-committee will provide direct and technical oversight for the implementation of this proposal and meet Gavi's requirements of a coordinating forum. In these sub-committees, EPI has a small, but strong partner base that will assist Government in technical oversight and monitoring of the deliverables in this application.

This application for the CCEOP was developed together with these formal structures and the final endorsement from the ICC was obtained at its meeting held on 30th August 2018 (ICC Q1 2018 Minutes_08Feb18; ICC Q2 Minutes_9May18; ICC Q3 2018 Minutes_30Aug18). Through the EPI committee, on-going engagement for further support of cold chain expansion will be on-going as it is a dynamic endeavour to continue strengthening cold chain as equipment breaks, becomes obsolete and requires further expansion.

CSOs in Zambia are very active in the healthcare sector and the Churches Health Association of Zambia (CHAZ) represents most of them collectively. On 7 June 2018, a successful meeting was held with 48 CSOs represented to brief them on the importance of the vaccine cold chain and on this application. Since then, they have submitted a list of 157 healthcare sites of their members of which 94 have been identified in the CCEI. They have now become active entries in the CCEI and will be updated on a similar basis to all other updates.

The National Logistics Working Group (NLWG) exists in Zambia but mainly focuses on essential medicines and logistics. The sub-committee for Logistics and Supply and Cold Chain reporting to the EPI committee handles all national issues regarding vaccine logistics and is chaired by the national EPI logistician. In all these existing structures, all stakeholders and role players are actively involved.

PART C: SITUATION ANALYSIS AND REQUESTED SUPPORT

This section gives an overview of the types of information the IRC will anticipate from countries in their application for CCE Optimisation Platform support. This section must be filled with appropriate reference to the country documents listed in Part B. Countries are required to provide a narrative in response to the following questions.

5. Situation analysis of country's supply chain and CCE (number, distribution, functionalities etc.) *(Maximum 3 pages) Please respond to all questions*

Countries are encouraged to cross reference (document title, page number) attached mandatory documents.

Information is required to cover the following areas:

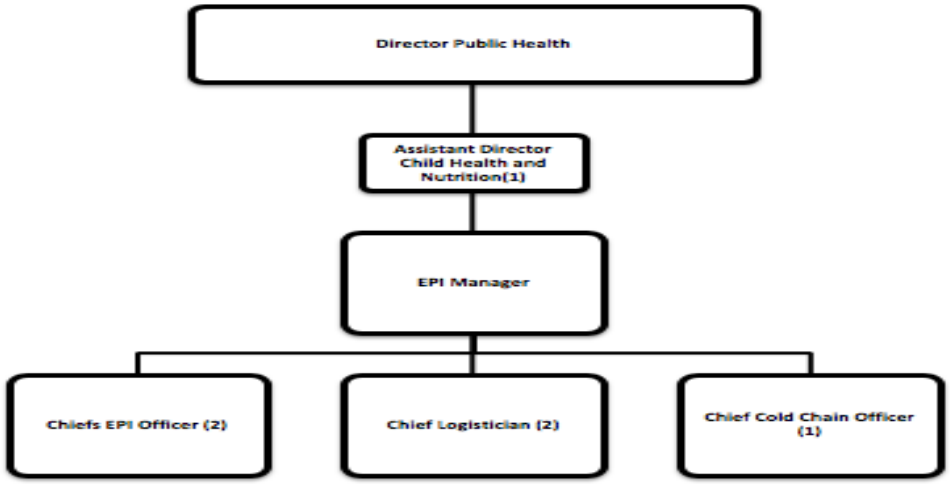
a) How is the country's immunisation supply chain administered?
b) What weaknesses have been identified in the country's supply chain?
c) Through what interventions are these weaknesses currently being addressed?
d) Describe challenges that are hindering the implementation of these interventions.
e) Describe lessons learnt from recent supply chain related support that inform the current request for CCE Optimisation Platform support.
f) What percentage of facilities have reliable access to grid electricity for up to or more than 8 hours per day?
g) Please give the quantity and percent of current CCE that is: a) functional; b) PQS-approved; c) non-PQS-approved; and/or d) obsolete?
h) What percent of the birth cohort is served by effectively functioning, PQS-approved CCE currently?
i) What are the bottlenecks that CCE can address in the current supply chain set-up (for example, capacity and technology constraints)?
j) Describe any other supply chain challenges that CCE Optimisation Platform support will assist in mitigating?
k) What are the overall CCE needs?

In Zambia, the immunisation supply chain runs separately from other essential medicines. The current immunisation supply chain follows the administrative hierarchy within the country, with the National level delivering vaccines quarterly to 10 Provinces, 109 Districts picking up vaccines monthly from the Provinces and over 3,000 Health Facilities picking up vaccines monthly from Districts with variances of weekly to once per quarter. Generally, vaccines are ordered on a pull system, based on census figures for catchment populations and the stock consumption that each level reports up to the next level of administration. National, Provincial and District levels record all vaccine stock information in Logistimo, an electronic stock management tool, while Health Facility stock information is paper-based, using stock control cards. Vaccine stock information stored on the stock control cards are reported at the end of each month. HCWs at the Health Facility fill in the Vaccine Return Form and deliver it to the District, after which they receive their allocated stock based on consumption from the prior month. Vaccine stock details are not recorded in the national HMIS, which tallies data collected from the MCH EPI registers on the number of vaccines given for each antigen.

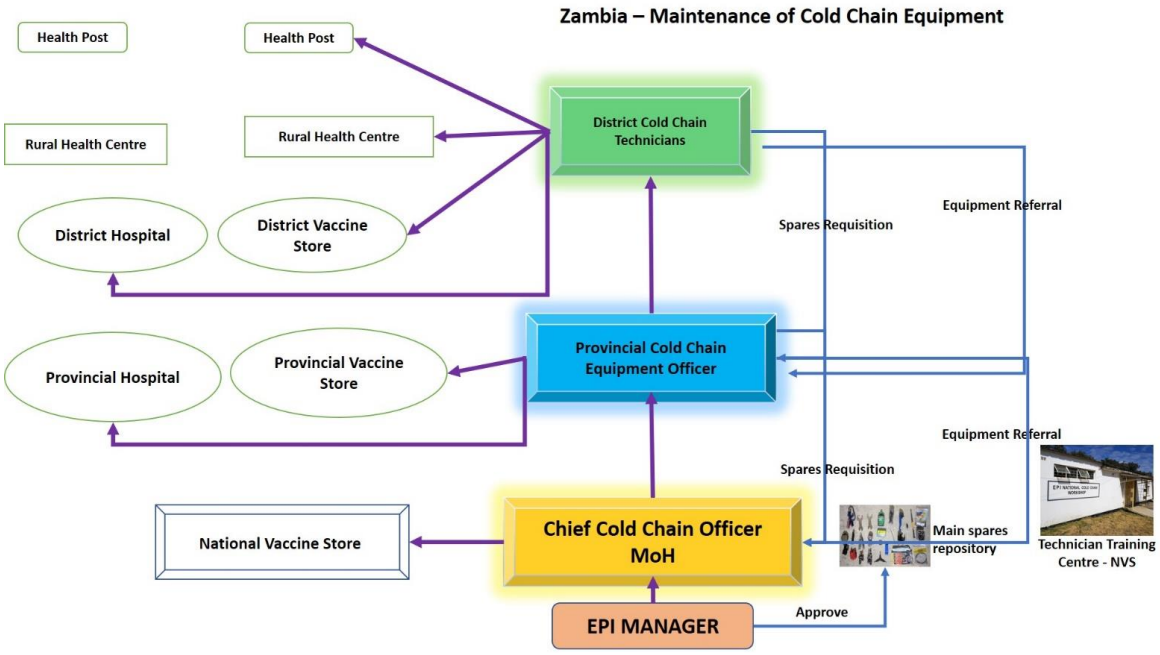
At the national level, the EPI manager leads strategic management of EPI with oversight by the EPI sub-committee and the Child Health and Nutrition Technical Working Group. There are two national level Logisticians responsible for EPI logistics and supply chain functions and one national cold chain officer, responsible for cold chain oversight and functions. There are also two EPI officers to support overall EPI activities, with one more focused on social mobilisation activities and the other on service delivery. Additionally, there is strong donor support from UNICEF (procurement, supply chain), the World Health Organisation (policy, procedures, surveillance), the Centre for Infectious Disease Research in Zambia (vaccine introduction, cold and supply chain), PATH (data culture and use) and CHAZ (civil society and advocacy). At both the provincial and district level, there is a logistician and a cold chain officer responsible for the immunisation supply and cold chain. Finally, approximately 3,000 health facilities deliver immunisation service to their respective communities, with nearly 20%

of these facilities managed by Civil Society Organisations, including Faith Based Organisations (FBOs) and private clinics.

The figure below represents the national level organogram for cold chain and logistics reporting. At a subnational level, logisticians and cold chain technicians report into the Provincial and District Public Health Specialist.



The figure below shows the cold chain maintenance organogram



In 2015, an EVMA was conducted, which showed significant improvement from the 2011 assessment across all 9 criteria, at all levels. Major weaknesses from the assessment were (Zambia 2015 EVMA Report_Oct15, p48; Zambia 2011 EVMA Report_28Aug11):

- Continuous temperature monitoring devices were not available below the provincial level and temperature records review were not done in most cases.
- Standard vaccine stock recording templates were also not available or not properly used where they were available.
- Physical counts and stock management indicators were not used as stock management tools.
- Maintenance records were largely not available, especially for vehicles and buildings.
- Absence of SOPs for vaccine stores at various levels.

- District and Health Facilities fared low in stock management (District 68%, Health Facility 59%), due to: incomplete stock ledgers; wastage not being recorded; staff unaware of how to handle expired or damaged vaccines and records were not kept; stock ledgers were not standardised and contained different indicators for stock recording; and at health facilities there was inadequate or more stock than required suggesting maldistribution or lack of proper distribution plans.

Recommendations from the 2015 EVMA were to:

- Build on existing momentum and expertise;
- Adopt EVM as a management and routine supervisory tool;
- Establish effective and functional supportive supervision between and within each level;
- Ensure proper documentation of planned preventive maintenance (PPM);
- Strengthen the Logistics Management Information Systems at all levels;
- Establish a system for wastage monitoring to monitor vaccine management performance;
- Review update & standardise the existing stock recording templates, and produce and disseminate same to all levels;
- Finalise, produce and disseminate the SOPs for vaccine stores; and
- Continue to use standard record keeping and filing system for EVM key indicators: Vaccine Arrivals, Temperature, Stock Management, Distribution and Maintenance.

In 2017, the Ministry of Health and partners underwent a system (re)design process to look at potential solutions to create a more efficient and effective immunisation supply chain. To guide decision making and ensure an evidence-based approach, data was collected across all ten provinces in Zambia, documenting current supply chain practices, inputs and costs. This data was used to provide a picture of how the current system operates and generate insights into potential ways to improve availability and data quality, as well as to reduce costs. It was found that nearly three-quarters of the supply chain costs were found at the health facility level, and there was considerable variation in costs between provinces. Another finding showed that health facility staff spend more than 100,000 hours per year away from other health care activities to pick up vaccines. While the average distance travelled to the district was 54 km, there was great variability in these distances. Poor road conditions were common in remote areas and demonstrated challenges many health facilities face in getting vaccines. A range of transportation options were used. In addition to vehicles, boats and public transport, there were several health facilities picking up vaccines by oxcart. On average, health facility staff travelled at least 4 hours, but many travelled up to 7 hours to pick-up vaccines.

Results of the system design modelling concluded that multi-stop routes with delivery from the province direct to health facilities is the most efficient way to deliver vaccines. In this recommendation, districts still maintain responsibility for EPI, but vaccines are brought directly to health facilities. These results, as well as those from the EVMA, DQS and other assessments have been incorporated into the EPI-Optimisation (EPI-OPT) strategy (EPI-OPT_Final Draft_1.12.17). The EPI-OPT strategy taking a holistic approach to improve EPI by improving health care worker knowledge and skills; optimising supply chain and logistics; improving data quality, visibility and use; and improving demand for immunisation services. Resource mobilisation efforts are underway in which these initiatives will be scaled to two provinces, with lessons learnt for national scale-up. This CCEOP application aligns with the system (re)design work and additional CCE is not required to scale.

The EVM Improvement Plan Progress Report addresses some of the weaknesses brought out in the in the 2015 EVMA Report, and the EPI team is engaged in interventions to try and address some of these concerns, such as testing for deployment the FridgeTag-3 for remote temperature monitoring at all levels. Other supply chain strengthening initiatives include:

- Procurement of RTMS for the large vaccine stores;
- Compilation of an SOP Manual (in process);
- Compilation of a Cold Chain Handbook (in process); and
- Printing of a Cold Chain Technicians Manual (reviewed and in process).

Keeping heat-sensitive vaccines at the right temperature is an important part of a functioning supply chain. For health facilities or posts that have no working cold chain or not equipment at all, on the day of vaccination, health workers must leave their posts to pick-up or drop-off vaccines to conduct immunisation sessions.

Even with current challenges, there are many lessons learnt within EPI to support this application. The country has successfully introduced many vaccines, conducted multiple campaigns and switches over the past few years, where logistics and supply and cold chain are key to their success. The national and sub-national logistics and cold chain personnel have been trained and able to install and maintain equipment in the system. Implementation of the Vaccine Cold Chain Scale-up Strategy also provided very important lessons and experiences for procurement and deployment of a substantial number of vaccine refrigerators, how to install and maintain them, and training of health care workers and technicians in the use and maintenance of electrical and solar powered refrigerators.

The updated CCEI contains the following equipment:
- Functional: 2,281
- Functional, need repair: 122
- Non-functional: 287
- Commission issues: 2
- Non-specified: 89

Given these statistics, 40% of the birth cohort is served by effectively functioning, PQS approved CCE (calculated from the CCEI tool). Also, of the current health facilities, approximately 32% (819 sites) have reliable access to grid electricity for up to or more than 16 hours a day.

Through this application and with additional CCE, EPI will be able to address some of its current supply and cold chain bottlenecks:
- Reducing the burden on health care workers to pick-up vaccines where no cold chain exists;
- New technology for monitoring refrigerator performance through remote temperature monitoring;
- Solar direct drive technology for solar for longer lasting and easier to maintain solar refrigerators;
- Replace old (50% of existing CCE are of age 10 years and more) and obsolete technology (kerosene and gas);
- Provision of voltage regulators for both new and old to reduce cold chain failure;
- The service bundle training will improve preventive maintenance skills of health workers and will minimise frequency of equipment breakdown; and
- Availability of spare parts which will aid in CCE maintenance.

These issues will not only address supply chain bottlenecks, but all address issues of equity and coverage as we reach the unreached with more readily available vaccines and also in areas of high volume, such as peri-urban areas. Additionally, the installation of solar equipment will reduce expensive energy supplementation by generators and reduce maintenance costs.

In this application the overall CCE needs are prioritised with new CCE to cater for new and existing sites without CCE, next to expand on facilities without enough cold chain capacity and then to replace old technology equipment, old equipment and not working equipment; the breakdown is as follows:
- 734 electric refrigerators
- 1,251 solar direct drive refrigerators
- 113 freezers
- 2,000 freeze-free vaccine carriers

- 1,500 freeze-free cold boxes
- 1,251 30-day electronic temperature loggers
- 109 Remote Temperature Monitoring Devices (RTMDs)
- 300 set of spare parts for existing and new cold chain equipment

As stated above, the country faces coverage and equity issues, and by equipping rural and hard to reach areas with Solar Direct Drive vaccine refrigerators, the country aims to bridge some of this gap. Additionally, SDD refrigerators also require less maintenance costs and save on providing generators, which also require ongoing fuel.

6. Expected immunisation coverage, equity and sustainability results *(Maximum 2 pages)*
Please respond to all questions

Countries are encouraged to cross reference (document title, page number) attached mandatory documents.

How will the requested Platform support concretely contribute to addressing identified geographic and socio-economic inequities and gender barriers to sustainable improvements in coverage and equity of immunisation? Examples may include (not exhaustive):

- *Geographically remote districts or those with low coverage*
- *Poorer communities (e.g. in the poorest 10% of the population)*
- *Communities where gender barriers are significant and/or where low levels of female education is common (as this is often associated with lower coverage)*

What analyses have been made, or what plans are underway, to optimise the design of the supply chain distribution system in order to improve the efficiency of the supply chain and contribute to achieving coverage and equity goals?

How have these system design considerations impacted the choice of CCE to be supported by the Platform?

Concretely, how will Platform support help improve the sustainability of the supply chain system?

How will the requested Platform support concretely contribute to addressing identified geographic and socio-economic inequities and gender barriers to sustainable improvements in coverage and equity of immunisation? Examples may include (not exhaustive):

- *Geographically remote districts or those with low coverage*
- *Poorer communities (e.g. in the poorest 10% of the population)*
- *Communities where gender barriers are significant and/or where low levels of female education is common (as this is often associated with lower coverage)*

In the 2018 coverage and equity study (Nikoloski et al), two indicators linked to equity were identified, i.e. rural populations by distance and peri-urban areas (final report not yet available). When coverage and equity improvements are considered in terms of the CCEOP and in the context of Zambia, the low density of rural populations and the high level of urbanisation, leads to the conclusion that remote facilities may help close the equity gap but risk widening the coverage gap. It would not be cost effective to provide a health facility a refrigerator because it was remotely located at the expense of a non-remote facility that would give many times more coverage improvements. A balance between the two is required. This proposal therefore prioritises sites in Phase 1 where no cold chain equipment currently exists. Then in Phase 2, this application will replace obsolete technology and old equipment.

As mentioned in the situation analysis, an immunisation supply chain system design exercise was performed with results and recommendations disseminated in 2017. It was recommended that multi-stop routes with delivery from the province direct to health facilities, ignoring administrative boundaries is the most efficient way to deliver vaccines. While the system design results have not been implemented yet, there are components of the findings that inform this application, including that many health facilities had more than adequate cold chain capacity (too large of a refrigerator for a small population), in this application the target population size for health facilities has guided the selection of appropriately sized vaccine refrigerators. Other findings from this exercise have been incorporated into the country's EPI-Optimisation strategy (EPI-OPT Final Draft_01.12.17), where efforts to mobilise funds are underway with the plan to implement the results in two provinces, and to learn and adapt lessons for scale.

EPI-OPT was also informed by the 2015 programme review, the 2012 DQA, the 2011 and 2015 EVMA and reports from recent vaccine introductions, and was developed to streamline innovations, improve coverage and equity and data accuracy through the following objectives:

- Strengthen and improve EPI knowledge and skills of HCW at lower levels on vaccine management and data quality;
- Improve immunisation supply and cold chain and logistics performance;
- Improve EPI programme monitoring and data quality, visibility and use for continuous improvement; and
- Improve demand for immunisation services.

It includes strengthening of the cold chain supply system and proposes changes in the vaccine distribution, brining Logistimo to the health facilities, and introducing remote temperature monitoring devices.

The system design work is complimentary to this application, as it works to strengthen the vaccine supply and cold chain supply system. System design has provided further information on the supply chains efficiency, cold chain usage and capacities, and given recommendations to improve with the ultimate goal of improving coverage and equity, while being more effective and efficient.

Additionally, the CCEOP platform will help improve the sustainability of the supply chain system in Zambia by:

- Increase efficiencies in the supply chain through an increase in access of vaccines at the point of service provision;
- Providing new freeze-free technology equipment will reduce risk of damage to vaccines;
- Enhancing temperature monitoring of vaccines to ensure vaccine potency;
- RTM devices increased cold chain uptime and equipment longevity;
- SDD vaccine refrigerators require less maintenance and last longer;
- Upgrading from old technology to the latest technology improves the sustainability of the supply chain system; and
- Providing a platform for refresher training (during delivery and installation) to the cold chain managers countrywide.

7. Maintenance plan (and its source of funding) and equipment disposal *(Maximum 2 pages)*
Please respond to all questions

Countries are encouraged to cross reference (document title, page number) attached mandatory documents.

Information is required to cover the following areas:

a) *How will the country ensure that aspects of maintaining the cold chain are addressed (e.g. preventive and corrective maintenance, monitoring functionality, technicians, financing for maintenance, etc.)?*
    - *What is the frequency of preventative and corrective maintenance that the country commits to (supported by partners)?*
    - *What technical support is anticipated for maintenance?*

b) *How will the country monitor the completion of preventive and corrective maintenance?*
    - *Which source(s) of funding will be used for maintenance, and to what extent are they assured?*

c) *How will the country dispose of obsolete and irreparable equipment replaced by CCE Optimisation Platform equipment?*

Zambia has developed and enacted a Cold Chain Equipment Maintenance Plan in 2018 (Zambia Cold Chain Equipment Maintenance Plan 2018_10Sept18). This plan guides health facility staff and cold chain technicians on the country's maintenance plan, including who is responsible for what type of maintenance and how often, and how it will be monitored and financed. There have been numerous cold chain trainings in the past few years on installation, maintenance and repairs of cold chain equipment to ensure a well-trained cadre of health care workers to maintain and repair equipment.

The chain of command for cold chain maintenance and repairs generally starts with health facility staff, who are responsible for daily maintenance tasks and report to the District Cold Chain Technicians on any equipment failure. The District CC technician provides any required technical support for repairs, maintenance, installation or decommissioning, and the Provincial CC technician or Principal Medical Equipment Officer provides any necessary technical support to the lower levels. The Provincial officer reports to the National Chief Cold Chain Officer at the Ministry of Health and serves as a coordination link between the National level and sub-national levels for the Cold Chain Equipment Inventory (CCEI), spares requisition and equipment repair referrals.

In the country's maintenance plan, there are two types of maintenance schedules observed, one is preventive, there other, corrective. Preventive maintenance is scheduled on a quarterly basis, with health facilities expected to conduct daily maintenance tasks, including regular removal of dust from equipment, checking of cables, defrosting, etc. Also, on a quarterly basis, supportive visits are to be conducted at subnational levels to routinely monitor preventive maintenance progress. The country does face challenges with carrying out the supportive visits though due to financial and human resource constraints. The second type of maintenance is corrective, which occurs when CCE fails, then it is assessed, rectified and a report written on what happened. For complex repairs and major CCE failure, reports are submitted to the next higher level for their attention. Upon receiving reports, responsible officers are expected to respond within 48 hours or less and provide a written report on the cause of the equipment failure, findings, status, outcome and recommendations where applicable. Preventive and corrective maintenance will be monitored through quarterly reports from CC technicians.

Currently, the only indicator related to monitoring of Cold Chain Maintenance is the number of Health Facilities with functional Cold Chain System through the Heath Management Information System (HMIS) and the Cold Chain Equipment Inventory (CCEI). There is no specific indicator to track both preventive and corrective cold chain maintenance activities at the different levels. CC Maintenance is currently being monitored through quarterly reports from the Cold Chain technicians, which will be updated in the CCEI. Each level of the supply chain is responsible to update the status of the vaccine refrigerators on a quarterly basis, with Districts updating for their health facilities, who submit it to the Provincial Health Office, and the province is to verify and submit to the national level where the national database is updated. Though in practice, there are challenges with getting accurate and timely data from the subnational levels.

In this CCEOP application, the following indicators will be used on a routine basis and captured for analysis at least twice per year.

1. Number of functional equipment as a percentage of total number of equipment (as identified by model)

2. Number of equipment repaired/maintained by the next level for repair
3. Number of temperature alarms during last quarter.

Data for these indicators will be verified through CCEI update, the CCE Maintenance Request Form and RTM reports.

Additionally, the national Senior CC officer manages receipt and inventory of spare parts. The national Senior CC Officer is responsible of certifying spares requests for sub-national levels, and then is approved by the National EPI Manager. All the correspondence from sub-national levels is done through the Permanent Secretary. The Provincial stores facilitate the requisition of spares for districts and provide feedback reports to the national level when spares are issued.

The current source of funding for CCE maintenance is through an existing Government budget line, as well as additional support from donors. Government's cold chain maintenance budget is a macro budget, and each province and district are required to break it down so as to suit implementation they require, such as preventive maintenance and corrective maintenance, and disposal of obsolete equipment. Activities for maintenance could include health facility visits for CCEI; supportive visits for CCE maintenance; onsite training of health facility staff in CCE maintenance; procurement of CCE spares or to conduct preventive maintenance and repairs of CCE.

To address issues of sustainability in the maintenance of CCE, there will be continued advocacy for increased government budgetary allocation towards the existing dedicated budget line for CCE at the national level. Currently there is a fixed budget line for CCE to enable national level to facilitate the procurement of CCE and spares, but it is insufficient to cover the need. As with other gaps within EPI, the programme will seek additional funds from partners through ICC and committees.

The disposal of obsolete and irreparable equipment is done through the Ministry of Works and Supply. The process starts by sending a letter of request for disposal of obsolete CCE, along with a Decommissioning Report, to the Ministry of Works and Supply that have to assess and bond the equipment for either auctioning or destruction depending on the status.

All activities which may affect the environment are regulated by the Zambia Environmental Management Authority (ZEMA), which is an independent environmental regulator and coordinating agency. The Public Finance Management Act, 2018, also regulates the process of establishing a Committee of Survey, which gives guidance and decides on the process of sale or destruction of Government assets. Together, these two major processes can be a lengthy procedure. To help overcome these challenges and to conserve available service space in health facilities, each District Health Management Office has a special designated area for the storage of redundant Government assets (bonded store) awaiting decisions by the relevant authorities. These processes and decisions are coordinated by the ten Provincial Health Management Offices.

No action can be taken with redundant equipment until the Committee of Survey has completed its inspection of the equipment and reached a decision on the disposal of such equipment either by auction sale or by destruction.

All cold chain technicians have the necessary documentation to state the reasons why the specific equipment should be considered by the Committee of Survey for disposal. If, however the equipment is found to be working by the technician but not fit to maintain the stringent temperature limits set for vaccines and could possibly be used for other purposes which do not require such stringent specifications, the technician may recommend to the District Health Management Office to re-distribute such equipment for use in situations where strict temperature limits are not required.

In this proposal, the first phase will not require any de-commissioning, though the second phase, where non-working equipment and old technology will be replaced, the decommissioning procedures will be followed. See the Zambia Cold Chain Equipment Decommissioning Plan for further details.

8. Other implementation details *(Maximum 1 page) Please respond to all questions*

Countries are encouraged to cross reference (document title, page number) attached mandatory documents.

Information is required to cover the following areas:

a) How will the country facilitate the manufacturer's or representative's role in equipment purchase, distribution and installation? *b) What is the source of the joint investment? Is the country's joint investment secured?* *c) Has the country secured import tariff exemptions for CCE? If yes, attach proof.*
UNICEF is responsible for the procurement of WHO pre-qualified CCE on behalf of the Ministry of Health. Requirements for CCE and logistics are detailed in the annual EPI forecast plan which is shared with UNICEF. Government prepares a request for cost estimates, which are sent to the UNICEF country office for cost confirmation. Once authorisation is given, equipment is procured and delivered. Upon arrival at the port of entry, the Ministry of Health is notified to facilitate the clearance and transportation of the items to the EPI stores at the national level, with a local clearing agent who provides the services of clearing, warehousing and transportation (Zambia MOH Prime-Time Contract_5Sept18). Currently the Ministry relies on government stores for storage of EPI supplies. The Ministry of Health has 3 x 15 tonnes trucks for distribution of EPI supplies to sub-national levels although other units within the Ministry of Health such as the malaria programme have more. The trucks will be available for distribution of the equipment if need be. Through the country's recent implementation of the Vaccine Cold Chain Scale-up Strategy, all distribution and installation of over 1,500 vaccine refrigerators was handled by Government staff and coordinated for delivery and installation from the national level to each province, district and health facility. The EPI team is well equipped to handle this endeavour and learned lessons for monitoring progress and tracking equipment. The government has over the years fully met all its co-financing obligations for the procurement of new and under-used vaccines as required. The Ministry of Health through the ICC will continue to advocate strongly with the Ministry of Finance for increased budgetary allocation for immunisation services. Additionally, the Minster of Finance's endorsement of the CCEOP application implies support for the funds required to meet the country's financial obligation. Tariff exemptions are applied on all Ministry of Health goods and services including all EPI supplies. However, government pays minimal fees on goods handling, shipping release, customs entry (documentation) and transportation. In addition, all Gavi funds and procured supplies are not taxed (see the attached letter of tariff exemption). Zambia has secured tariff exemptions for cold chain equipment in this proposal (Proof of Status for CCE Tariff Exemptions Waivers_Signed_22.10.14). The country also conducted a data verification exercise of the CCEI (Data Validation Report_12Oct18). The EPI team reviewed inventory data from 19 facilities and verified collected data from the sub-national level on cold chain inventory information.

PART D: INITIAL SUPPORT PHASE

This **initial support phase** (through years 1 and 2) is designed to address urgent CCE needs contributing to improvements in coverage and equity, to protect vaccine stocks, complement investments in other supply chain 'fundamentals' and contribute to full scale-up of optimised, sustainable supply chains.

☆	Budgets are **not inclusive** of operational cost. Operational costs must be financed by Ministry of Health or other partners.

CCE	Further information on CCE rehabilitation and expansion plan, equipment selection and strategic deployment plan requirements is provided in Application guidelines Section 5, available at http://www.gavi.org/support/process/apply/cceop/

9. Prioritised (Urgent) CCE needs *(Maximum 3 pages)*

*Provide information on **2 to 4 prioritised (urgent) CCE needs** as identified in the 'CCE rehabilitation and expansion plan, equipment selection and strategic deployment plan requirements'.*

For each prioritised (urgent) CCE need, please provide the following information:

1. ***The need:** Type of activity (e.g. replace obsolete CCE, extend CCE to unequipped facilities, etc.); specific CCE site (facility); type of equipment required; quantity of equipment items.*
2. ***Justification:** Reasons for urgent need (e.g. low CCE and/or immunisation (Penta3) coverage area, gender barriers, mobile population, etc.); current CCE and immunisation (Penta3) coverage in the population area.*
3. ***Expected outcome:** Anticipated increase in CCE and immunisation coverage (Penta3); anticipated progress against identified inequity (describe, in alignment with country Performance framework).*
4. ***Total CCE budget:** includes Gavi and country joint investment share*

Prioritised (Urgent) CCE Need #1	
The need	610 sites to extend CCE to facilities with a catchment population of over 5,000 people in year 1 (a) without CCE and (b) who have severe gaps in CCE capacity
Justification	The Government of the Republic of Zambia has built new health facilities which need vaccine refrigerators, plus there are many facilities with severe gaps in CCE in facilities with a catchment area of over 5,000 population. This will equip the 610 health facilities without CCE (269 solar and 191electric) and 164 facilities with severe gap (85 solar and 79 electric). (WHO_CCE_InventoryGapAnalysis_Zambia_16Oct18)
Expected outcome	Will provide new immunisation services throughout the country (all 10 Provinces) and support the increase in coverage and equity in these Districts
Total CCE budget	USD 3,657,473
Prioritised (Urgent) CCE Need #2	
The need	792 sites to extend CCE to facilities with a catchment population of below 5,000 people in year 2 (a) without CCE and (b) who have severe gaps in CCE capacity
Justification	The Government of the Republic of Zambia has built new health facilities which need vaccine refrigerators, plus there are many facilities with severe gaps in CCE in facilities with a catchment area of under 5,000 people. This

	will equip the 698 health facilities without CCE (536 solar and 162 electric) and 94 facilities with severe gap (69 solar and 25 electric). (WHO_CCE_InventoryGapAnalysis_Zambia_16Oct18)
Expected outcome	Will provide new immunisation services throughout the country (all 10 Provinces) and support the increase in coverage and equity in these Districts
Total CCE budget	USD 4,772,301
GRAND TOTAL CCE BUDGET: (Years 1&2)	USD 8,429,775 (Please see Zambia_CCCEOP_Budget_16Oct18)

10. Summary of INITIAL SUPPORT PHASE replacement/rehabilitation, expansion and extension plan

All countries must fill this section to highlight the number of equipment and corresponding number of sites these equipment will serve to meet their replacement/rehabilitation, expansion and extension targets. The values entered below must align with those in Section 9 above and in other parts of the application form.

Replacement/Rehabilitation				**Expansion**		**Extension**	
Existing sites with (non)functional and/or obsolete non-PQS equipment to be replaced with platform-eligible ILR, SDD or long-term passive devices (including equipping sites with a larger equipment)		Existing sites with (non)functional and/or obsolete PQS equipment to be replaced with platform-eligible ILR, SDD or long-term passive devices (including equipping sites with a larger equipment)		Equipping existing sites with ADDITIONAL pieces of equipment for new vaccine introduction and/or to serve an increasing population		Equipping previously unequipped sites (providing immunisation services or not, including existing sites without active devices) and add new service sites	
No of Equipment	*No of sites*	*No of Equipment*	*No of sites*	*No of Equipment*	*No of sites*	*No of Equipment*	*No of sites*
164	160					460	450
94	94					698	698
Total=258	***Total=254***	***Total***	***Total***	***Total=0***	***Total=0***	***Total=1,158***	***1,148***

11. Ongoing or planned activities around other supply chain fundamentals in the initial support phase	
In this section, linkages must be drawn between requested CCE Optimisation Platform support, on-going Gavi investments (especially through the Health Systems Strengthening support) and other partner supply chain support. *Describe planned or ongoing activities related to other supply chain fundamentals during the initial support phase, including their sources of funding. Responses to this section should be linked to the EVM Improvement Plan.*	
Supply chain managers *Describe all planned or ongoing activities related to improving the availability and performance of supply chain managers, their sources of funding, and partner support.*	-Expand the membership of the EPI Cold Chain and Logistics Committee to include private sector and essential medicines logisticians -Training of Provincial Logistics core groups in supervision skills for effective vaccine management of supply chain. -Training of Provincial cold chain core groups in supervision skills. -Source of funding will be the government and partners through PEF and other support. Additional funds will also be sought through the ICC and the EPI committee.
Data for supply chain management *Describe all planned or ongoing activities related to data for management, their sources of funding, and partner support. In particular, provide information explaining how improvements to the functionality of logistics management systems will improve the visibility of up-to-date and accurate vaccine stock records at each level of the vaccine supply chain.*	-Logistimo in Zambia is currently operational at National, Provincial and District Vaccine Stores and all Health Facilities in Lusaka district as the vaccine stock management system. -Plans are underway to roll the system to all facilities to improve real time visibility of vaccine stock records at all levels of supply chain, after guidance from the upcoming evaluation is given. -For the CCE Inventory, the country is currently using the WHO Inventory Gap Analysis Tool to capture facility structure and equipment. The tool has posed challenges, especially for capturing data at sub-national levels and due to embedded formulas. During the most recent update (July 2018) at the national level, a simplified excel workbook was used due to these challenges. -The Zambia Electronic Immunisation Registry (ZEIR) will also be a user-friendly and simplified to platform to manage inventory and site data in a more effective way. Capacity in data cleaning and sorting will be enhanced at the source of collection i.e. health facility and district to ensure accuracy and uniformity. To achieve this the

	National vaccine store will provide the standard template for collecting the information and the Provincial vaccine store will aggregate district reports and send them to the national level to update the database. Other considerations include exploring the alternative systems such as DHIS2 to have the real time inventory of vaccine and equipment stock which will be easily accessed by programme officers at district and above levels. Government and partners have been funding the implementation of these systems and remain the potential funders for future plans. Additional funds will also be sought through the ICC and the EPI committee.
Optimised, efficient design of distribution system *Describe all planned or ongoing activities related to distribution system design optimisation, their sources of funding, and partner support.*	Currently, the vaccine supply chain involves National levels distributing to Provinces on quarterly basis, Districts collecting from Provinces monthly, and health facilities collecting from Districts monthly. A system design approach was used to assess the immunisation supply chain and to look for ways to make it more efficient. As part of the EPI-OPT strategy, a new approach to vaccine delivery will be implemented, evaluated and recommendations for scale will be made. Vaccines will be delivered directly to health facilities using multi-stop routes. An efficient and high-performing supply chain will help protect the country's investment in vaccines and enable better control over vaccine storage and distribution temperatures. This will also shorten delivery time and frequency to the end users. Government and partners have been funding the implementation of these systems and remain the potential funders for future plans. Additional funds will also be sought through the ICC and the EPI committee.
Continuous improvement process *Describe all planned or ongoing activities related to continuous improvement processes, their sources of funding, and partner support.*	An EVM workplan is in place for the next 5 years stipulating various activities under each EVM criteria, some of the most critical are: • Using the Logistimo platform down to the health facility level and RTMs in the new equipment procured.

	• 3. Part of the funding exists through the 2018 oral cholera vaccination support which had a budget line on supporting remote temperature monitoring. The rest will be funded through the CCEOP resourcing. • Comprehensive EPI supportive supervision to lower levels in effective vaccine management. • Compilation of SOP manual, cold chain handbook, printing and distribution to all levels. UNICEF, GRZ and other potential partners will be the source of funding.
Temperature monitoring *Describe the temperature monitoring devices that are currently available in the country? E.g. central level (CTMS), sub-national, lowest distribution and service delivery levels (30 DTRs and RTM devices), and during transportation (freeze tags).* *<u>Furthermore, describe which measures are in place to</u>* *a) obtain temperature data from the various devices;* *b) act following temperature alarms (curative maintenance);* *c) in case of RTM devices, please elaborate on SOPs for each responder in the temperature monitoring system; and* *d) countries wishing to purchase such devices are required to demonstrate how the recurrent costs, such as HR, data transmission, analysis etc., will be covered in this section.*	• National Vaccine Store: 5 auto dialers. • Provincial Vaccine Stores: 10 auto diallers, one for each cold room. • Districts and health facilities are currently using temperature-monitoring charts to record temperature twice in a day including weekends and public holidays. Remote Temperature Monitoring (RTM) is being piloted in 2 districts using the Logistimo platform and FridgeTag-3. Distribution is done using chilled packs and freeze tags are not used. • Temperature data from auto diallers is obtained through SMS to the contact persons and also through USB connection. For RTM devices currently installed the temperature data is obtained through an existing supply chain web based system, Logistimo. **a)** For auto diallers and RTMs, the person responsible will receive an SMS alert following temperature alarm. **b)** Responder is supposed to check for temperature excursions outside the recommended temperature range. The responder is then supposed to document and discuss with the supervisor any actions that need to be taken. **c)** With the RTMs planned for in the CCEOP, district and health facility staff

	will be oriented during installation. For data transmission and analysis, the Ministry of Health already have a good understanding with the mobile service providers and the Zambia Information and Communication Technology Authority for data bundles for such activities. Data analysis will be every month end. Government and partners have been funding the implementation of these systems and remain the potential funders for future plans. Additional funds will also be sought through the ICC and the EPI committee.

PART E: SCALE-UP SUPPORT PHASE

This second phase of Gavi CCE Optimisation Platform support (provided from approximately year 3 onwards) is designed to address additional CCE needs as part of optimising design and increasing the sustainability of the supply chain.

☆	Budgets are **not inclusive** of operational cost. Operational costs must be financed by Ministry of Health or other partners.

12. Prioritised (Additional) CCE needs *(Maximum 3 pages)*

*Provide information on **2 to 4 prioritised (additional) CCE needs** as identified in the 'CCE rehabilitation and expansion plan, equipment selection and strategic deployment plan requirements'.*

For each prioritised (additional) CCE need, please provide the following information:

1. ***The need:*** *Type of activity (e.g. replace obsolete CCE, extend CCE to unequipped facilities, etc.); specific CCE site (facility); type of equipment required; quantity of equipment items.*
2. ***Justification:*** *Reasons for urgent need (e.g. low CCE and/or immunisation (Penta3) coverage area, gender barriers, mobile population, etc.); current CCE and immunisation (Penta3) coverage in the population area.*
3. ***Expected outcome:*** *Anticipated increase in CCE and immunisation coverage (Penta3); anticipated progress against identified inequity (describe, in alignment with country Performance framework).*
4. ***Total CCE budget:*** *includes Gavi and country joint investment share*

Prioritised (Additional) CCE Need #1	
The need	Increase capacity of cold chain for sites with insufficient capacity and replacement of obsolete, non-PQS and non-repairable CCE in year 3
Justification	460 sites requiring additional cold chain capacity and at the same time replacement of obsolete, non-PQS and non-repairable CCE with 288 solar and 184 electric CCE
Expected outcome	This will increase the capacity of facilities without adequate cold chain capacity

Total CCE budget	USD 2,834,278
Prioritised (Additional) CCE Need #2	
The need	50 sites requiring replacement of obsolete, non-PQS and non-repairable CCE with 4 solar and 93 electric CCE in year 4
Justification	All gas, kerosene, old and non-repairable CCE will be will be replaced with 97 new technology CCE, with 4 solar and 93 electric
Expected outcome	This will replace old, non-PQS and not-working CCE to new technology and freeze free CCE to provide a safer storage environment for the vaccines. Sustainable, reliable and low maintenance cold chain equipment continually providing a backbone to the immunisation programme.
Total CCE budget	USD 324,268
GRAND TOTAL CCE BUDGET: "Scale-up support" (Years 3, 4 & 5)	USD 3,158,546 (Please see Zambia_CCCEOP_Budget_16Oct18)

13. Summary of SCALE-UP SUPPORT PHASE replacement/rehabilitation, expansion and extension plan

All countries must fill this section to highlight the number of equipment and corresponding number of sites these equipment will serve to meet their replacement/rehabilitation, expansion and extension targets. The values entered below must align with those in Section 9 above and in other parts of the application form.

Replacement/Rehabilitation				**Expansion**		**Extension**	
Existing sites with (non)functional and/or obsolete non-PQS equipment to be replaced with platform-eligible ILR, SDD or long-term passive devices (including equipping sites with a larger equipment)		Existing sites with (non)functional and/or obsolete PQS equipment to be replaced with platform-eligible ILR, SDD or long-term passive devices (including equipping sites with a larger equipment)		Equipping existing sites with ADDITIONAL pieces of equipment for new vaccine introduction and/or to serve an increasing population		Equipping previously unequipped sites (providing immunisation services or not, including existing sites without active devices) and add new service sites	
No of Equipment	*No of sites*	*No of Equipment*	*No of sites*	*No of Equipment*	*No of sites*	*No of Equipment*	*No of sites*
402	390			70	70		
97	50						
Total=499	***Total=440***	***Total***	***Total***	***Total=70***	***Total=70***	***Total=0***	***Total=0***

14. Ongoing or planned activities around other supply chain fundamentals in the scale-up support phase	
In this section, linkages must be drawn between requested CCE Optimisation Platform support, on-going Gavi investments (especially through the Health Systems Strengthening support) and other partner supply chain support. *Describe planned or ongoing activities related to other supply chain fundamentals during the scale-up support phase, including their sources of funding. Responses to this section should be linked to the EVM Improvement Plan.*	
Supply chain managers *Describe all planned or ongoing activities related to improving the availability and performance of supply chain managers, their sources of funding, and partner support.*	See above for initial phase
Data for supply chain management *Describe all planned or ongoing activities related to data for management, their sources of funding, and partner support. In particular, provide information explaining how improvements to the functionality of logistics management systems will improve the visibility of up-to-date and accurate vaccine stock records at each level of the vaccine supply chain.*	See above for initial phase
Optimised, efficient design of distribution system *Describe all planned or ongoing activities related to distribution system design optimisation, their sources of funding, and partner support.*	See above for initial phase
Continuous improvement process *Describe all planned or ongoing activities related to continuous improvement processes, their sources of funding, and partner support.*	See above for initial phase
Temperature monitoring *Describe how the temperature monitoring system will evolve? Which devices will be used?* *Furthermore, describe which measures are in place to* *a) obtain temperature data from the various devices;* *b) act following temperature alarms (curative maintenance);* *c) in case of RTM devices, please elaborate on SOPs for each responder in the temperature monitoring system; and* *d) countries wishing to purchase such devices are required to demonstrate how the recurrent costs, such as HR, data transmission, analysis etc., will be covered in this section.*	See above for initial phase

PART F: BUDGET TEMPLATES

This section details the number of requested equipment items and equivalent budget. A maximum investment amount (and indicative number of equipment items) corresponding to the phased support request will be considered for recommendation of approval by the IRC and subsequent decision by Gavi.

However, in consultation with the Secretariat and in-country partners, the number of equipment items may be modified when the detailed operational plan is developed subsequent to the Platform proposal and the support may vary within the limit of the approved maximum amount.

Budgets must be completed in the attached budget template, and with reference to the ***CCE Optimisation Platform Guidelines, Gavi CCE Optimisation Platform Technology Guide and CCE planning prices and Total Cost of Ownership (TCO) analysis tool.***

15. CCE Optimisation Platform - Budget Template

*To be filled by **ALL** countries after selection of equipment that best suit their CCE needs (e.g. specific model and make).*

Countries will plan with indicative PQS prices and corresponding service bundle estimates (depending on equipment being on/off-grid and estimated costs of service bundle).

Planning price ranges are provided in this template.

How to fill the attached budget template: Countries should:

- *Select appropriate 'Equipment Model' against the listed equipment types*
- *Fill out the 'Estimated service bundle cost' and 'Number of equipment' requested*
- *(In the last 'Total CCE OP Request' table), fill out second and third preference for each model selected. The second and third preference should be comparable products in the same capacity segment.* **Countries are informed that Gavi, and its Alliance partners principally UNICEF, will try as much as possible to respond to countries' first preference, but manufacturers' lead time could also lead to countries receiving cost estimates for either their second or third preference.**

Completed budget template should be sent as an attachment along with application form.

Budgeting for Buffer and Procurement fees

- *Buffer fees: A 7% buffer on **total equipment cost** is built into country yearly budgets. This will cover currency variations, demurrage and associated costs and will be returned to country, if unused.*
- *Procurement fees: Countries will also need to **pay UNICEF's procurement costs for the country joint investment portion**, estimated to be up to 8.5%. Please obtain actual amounts from the UNICEF country office.*

PART G: PERFORMANCE FRAMEWORK

Countries must include **CCE Optimisation Platform indicators** in the application. The indicators need to be included in the Performance Framework for the current and/or proposed Gavi HSS support, after Platform proposal approval.

According to their specific context, countries are required to consider the most appropriate data sources to report on programme implementation and progress against the targets set. This should be discussed with partners (which may provide technical assistance) and the Gavi Secretariat.

Programmatic reporting updates, as well as targets and indicator updates, will be made as part of the Gavi performance framework and annual Joint Appraisal process. Countries are expected to consider relevant smart indicators to be monitored and reported against, in terms of intermediate results or outcomes/impact.

16. Indicator monitoring and reporting requirements
*As a **minimum**, countries need to monitor and report on:* • ***5 MANDATORY intermediate results indicators;*** • ***1 MANDATORY intermediate result indicators <u>if countries are procuring User independent freeze protected cold boxes and vaccine carriers;</u> and*** • ***1 to 3 ADDITIONAL intermediate results indicator(s).***
1) ***CCE Replacement/Rehabilitation in existing equipped sites**: Percentage of existing sites with (non)functional and/or obsolete non-PQS and PQS equipment to be replaced with platform-eligible ILR, SDD or long-term passive devices (including equipping sites with a larger equipment)* *2)* ***CCE Expansion in existing sites:** Percentage of existing sites being equipped with ADDITIONAL pieces of equipment for new vaccine introduction and/or to serve an increasing population;* ***3. CCE Extension in unequipped existing and in new sites:** Percentage of previously unequipped sites (providing immunisation services or not, including existing sites without active devices) and new service sites being equipped with Platform eligible equipment.* ***4. CCE maintenance :** Well-defined indicator proposed by country to reflect appropriate maintenance of equipment; for example, percentage of equipped facilities with functioning cold chain,[4] such as demonstrated by remote temperature monitoring; **and***

[4] **Indicator definition**: *% CCE functioning = (# functioning CCE devices) / (total # of CCE devices designated for use)*. CCE devices considered for this indicator include all refrigerators, fixed passive storage devices, walk-in cold rooms and freezers designated for string vaccines. Both the numerator and denominator should be collected from the

3) ***5. Freeze-free to non-freeze-free carrier ratio:*** *Ratio of freeze-free cold boxes/carriers to non-freeze-free cold boxes/carriers in-country?*

USE THE TABLE BELOW TO COMPLETE MANDATORY INDICATORS							
Indicator *(Provide name of the mandatory indicator as shown above)*	***Definition*** *(Provide definition if not already specified)*	***Data Source*** *(identify data source)*	***Reporting frequency*** *(Annual, semi-annual, quarterly etc.)*	***Baseline (2018)*** *(Provide numerator and denominator for calculating percentage)*	***Target Year 1 – 2019/2020*** *(Provide numerator and denominator for calculating percentage)*	***Target Year 2 – 2020/2021*** *(Provide numerator and denominator for calculating percentage)*	***Target Year 3 (2021/2022)*** *(Provide numerator and denominator for calculating percentage)*
1. ***CCE Replacement/ rehabilitation in existing Equipped sites***	*Percentage of existing sites with (non)functional and/or obsolete non-PQS and PQS equipment to be replaced with platform-eligible ILR, SDD or long-term passive devices (including equipping sites with a larger equipment)*	District/ Province update system	*semi-annual* for CCEI and Annually for CCEOP Progress	Numerator = 694 Denominator = 2,589 Percentage = 26.8%	Numerator = 304 Denominator = 2,589 Percentage = 11.7%	Numerator = 254 Denominator = 2,589 Percentage = 9.8%	**Y4 2022/2023** Numerator = 94 (number of obsolete non-PQS CCE to be replaced) Denominator = 2,589 Percentage = 3.6% **Y4/5** Numerator = 0 Denominator = 2,589; Percentage = 0%
2. ***CCE expansion in existing equipped sites:***	*Percentage of existing sites being equipped with ADDITIONAL pieces of equipment for new vaccine*	District/ Prov update system	*semi-annual* for CCEI & Annually for CCEOP	Numerator = 0 Denominator = 70 Percentage = 0%	Numerator = 0 Denominator = 70 Percentage = 0%	Numerator = 70 Denominator = 70 Percentage = 100%	N/A

same geographical area / period in time and should not include decommissioned equipment. Functionality of CCE is broadly defined to mean that the device is operable at a particular point in time for storing vaccine.

	introduction and/or to serve an increasing population;						
3.. CCE extension in unequipped existing and/or new sites:	*Percentage of previously unequipped sites (providing immunisation services or not, including existing sites without active devices) and new service sites being equipped with Platform eligible equipment.*	District/ Province update system	Quarterly for CCEI and Annually for CCEOP Progress	Numerator = 0 Denominator = 1148 Percentage = 0%	Numerator = 450 Denominator = 1148 Percentage = 39%	Numerator = 1148 Denominator = 1148 Percentage = 100%	N/A
4. ***CCE maintenance***	*Percentage of facilities with new solar cold chain equipment and all districts (verified through remote temperature monitoring devices)*	CCEI	Quarterly and annually	Numerator = 23 (pilot RTMs) Denominator: 1,274 (23 + 1,251 being procured) Percentage: 1.8%	Numerator = 377 Denominator: 1,274 Percentage: 30% It's anticipated that the number of non-functional equipment will go up only because RTM will allow us to see real time and more accurate data	Numerator = 982 Denominator: 1,450 Percentage: 77%	Year 3 Numerator = 1,274 Denominator: 1,274 Percentage: 100%%
5. ***Freeze-free to non-freeze-free carrier ratio***	*Ratio of freeze-free cold boxes/carriers to non-freeze-free cold boxes/carriers in-country*	Freeze-free/non freeze-free	Annually	Carriers 0/4723 Percentage: 0% Cold boxes 0/655 Percentage: 0%	Carriers 500/4723 Percentage: 10.6% Cold boxes 500/655 Percentage: 76.3% Large facilities are	Carriers N/A Cold boxes 655/655 Percentage: 76.3% Remaining supply goes to new sites	Carriers Y3 1000/4723 21% Y4 2,000/4723 Percentage: 43%

					targeted to get cold boxes of capacity around 10 Litres		N/A

ADDITIONAL intermediate results indicator(s): *Countries are required to suggest 1 to 3 intermediate results indicators to track performance of rehabilitation, expansion, maintenance and/or other supply chain fundamentals (include baseline, data source, targets and frequency of reporting).*

Examples *of additional intermediate results indicators options are:*

1. ***Functional status of cold chain equipment****: Ratio of functional CCE and ratio of districts with at least 90% functional equipment;*
2. ***Closed vial wastage****: Rate at a national, district and facility level;*
3. ***Forecasted demand ratio****: Ratio of actual usage compared to forecast (vaccines);*
4. ***Full stock availability:*** *Ratio of facilities/districts without any stock out;*
    a. *Stocked according to plan: Percentage of facilities/stores/districts that have stocks levels between set minimum and maximum stock levels;*
5. ***Temperature alarms:*** *Frequency and magnitude of heat and cold alarms per monitoring period (i.e., temperature excursion) and number of CCE devices with more than a certain level of temperature excursion;*
6. *Rate of health facilities dashboard use, timely analysis and use for decision making;*
7. ***On-time and in-full (OTIF) delivery****: Ratio of order completely delivered on time;* ***or***
8. *Number of health managers trained and despatched for supply chain oversight function and rate of reported monitoring activities.*

USE THE TABLE BELOW TO COMPLETE ADDITIONAL INDICATORS

Indicator *(Provide name of the* ***additional*** *indicators as shown above)*	***Definition*** *(Provide definition if not already specified)*	***Data Source*** *(identify data source)*	***Reporting frequency*** *(annual, semi-annual, quarterly etc.)*	***Baseline (Year)*** *(Provide numerator and denominator for calculating percentage)*	***Target Year 1*** *(Provide numerator and denominator for calculating percentage)*	***Target Year 2*** *(Provide numerator and denominator for calculating percentage)*	***Target Year 3 (If applicable)*** *(Provide numerator and denominator for calculating percentage)*
1. Temperature alarms	Number of high and low (outside 2-8^0 c) alarm events for over 2 hours per month for each *new solar cold chain equipment and all districts*	RTM dashboard	Bi-annual	Unknown	10 events out of 486 units per month (1:50) (for 23 existing RTMS + 463 new RTMS	18 events out of 1,091 units per month (1:60) (+ 605 new RTMs)	Y3 20 events out of 1,379 units per month (1:70) (+ 288 new RTMs) Y4

							17 events out of 1,383 units per month (1:80) (+ 4 new RTMs)