Building a stronger medical ecosystem in Namibia: Exploring investment opportunities in liquid oxygen

Background

The Meeting Targets and Maintaining Epidemic Control (EpiC) project, funded by the United States Agency for International Development (USAID), is dedicated to achieving and maintaining HIV epidemic control and preventing, preparing for, responding to, and bolstering health systems to address global health security threats, including COVID-19. One key aspect of the project's focus is to bolster overall health systems and strengthen medical oxygen ecosystems, including improving access to medical liquid oxygen (LOX).

LOX holds promise for enhancing sustainable access to oxygen therapy in lower- and middle-income countries (LMICs), but its deployment has been limited. This is due to lower production and higher costs compared to higher-resource settings, exacerbated by limited capital access for industrial gas companies in LMICs, which has resulted in a classic market trap of low volume and higher pricing, making it less appealing to ministries of health.

EPIC'S KEY ACCOMPLISHMENTS

- Engaged with both demand and supply-side stakeholders
- Conducted on-site assessments of 18 health facilities across the country
- Held consultations with country's oxygen supply stakeholders
- Conducted cost analysis of current oxygen systems in health facilities
- Produced a detailed report documenting the current situation and investment options
- Assessed the technical feasibility for medical-graded oxygen production at a local ASU in Namibia

Challenges in oxygen delivery amid rising needs in Namibia

Namibia experiences major challenges with illnesses or conditions that cause hypoxemia. HIV, tuberculosis (TB), and lower respiratory tract infections continue to be the leading cause of death. In 2022, the country recorded more than 17,000 confirmed cases of malaria,[1] 172,256 COVID-19 cases with 4,103 deaths,[2] and 8,604 TB patients.[3] The critical nature of these cases requires oxygen for treatment. Over the past decade, the burden has continued to rise, yet the COVID-19 pandemic exposed significant shortcomings in Namibia's oxygen delivery system.

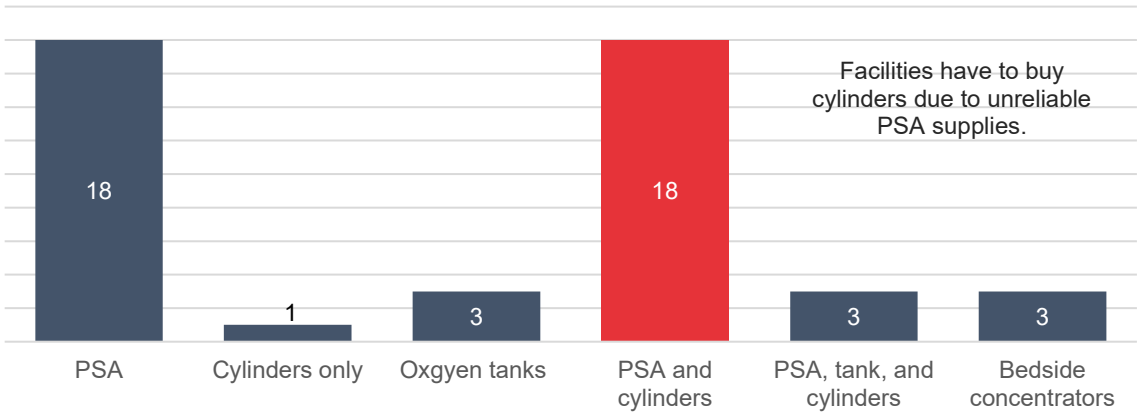
The EpiC project, in partnership with the Ministry of Health and Social Services (MHSS), collaborated with technical partners and industrial gas suppliers (see full stakeholder list in Annex 1) to investigate market-shaping interventions that secure a short-term supply of LOX at more affordable prices and foster a stronger and more sustainable oxygen market. From March 2023 through March 2024, EpiC undertook desk research and stakeholder consultations to assess the oxygen delivery systems in Namibia and produced an overview of the supply and demand landscape, including system strengths and challenges faced by health facilities in using different oxygen sources.

After the desk review, we prioritized 18 facilities for on-site assessments, in close consultation with the MHSS. The on-site assessments involved a physical visit for data collection and identification of gaps. From the qualitative and quantitative data collected, EpiC Namibia conducted analysis to estimate oxygen needs, identify system inefficiencies, and recommend interventions to improve LOX affordability and availability.

Sources of medical oxygen

While Namibia has multiple medical oxygen sources and suppliers, the current supply and storage options include: (1) oxygen generation through on-site oxygen-generation Pressure Swing Adsorption (PSA) plants, (2) storage in the form of liquid oxygen in cryogenic tanks, (3) oxygen cylinders procured from local private suppliers, and (4) production of oxygen using oxygen concentrators within hospitals.

Figure 1. Number of health facilities by oxygen source



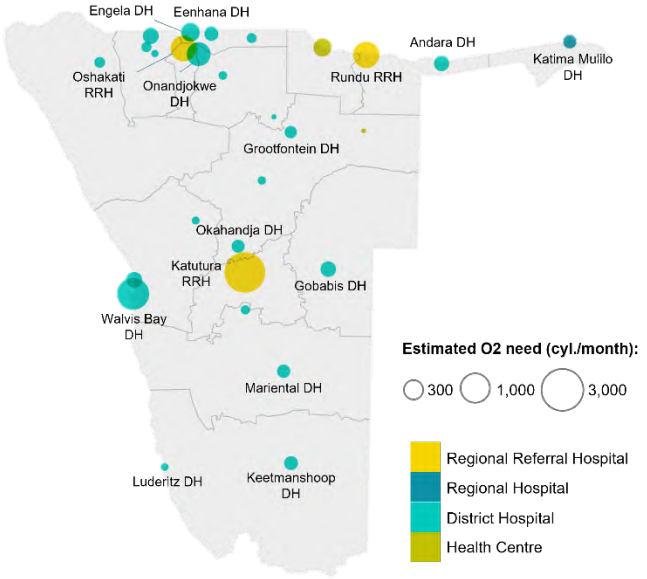
Source: Analysis of the facility assessement data

The country faces challenges with oxygen distribution and infrastructure. The desk review identified six facilities with PSA plants and LOX tanks, three of which were included in the on-site assessments (see Annex 2 for list of facilities). However, a preference for oxygen cylinders remains due to the inconsistent supply from PSA plants and expensive LOX tank refills from Afrox. The existing PSA systems, which are more than 10 years old, lack proper maintenance and have limited capacity to meet the current demand while, at the time of the assessment, only one PSA (at Onadjokwe Hospital) of the 13 new PSAs was operational. Additionally, LOX is currently imported from South Africa with high delivery and distribution costs due to the country's vast size. This is exacerbated by the generally hot climate that increases the rate of evaporation from tanks and cylinders, in transit and in situ. This situation highlighted the necessity to build a stronger and sustainable oxygen market.

Oxygen need estimation

To inform estimation of the full extent of the medical oxygen needs in the country, a quantification exercise was performed for 28 health facilities identified as high-need and priority facilities by the MHSS. The selection criteria included admission numbers, care level, infrastructure, and geographic equity. The total oxygen need was calculated using hypoxemia prevalence assumptions for different bed and patient types, bed turnover rate, typical flowrate, and oxygen therapy duration for each bed type. The total monthly oxygen need of these 28 priority facilities is estimated at **97.14 million liters per month (~13,600 J-size cylinders)**. Namibia is the least densely populated country in Africa, and a spatial analysis using the above calculation shows that the oxygen needed is relatively evenly spread out geographically (see Annex 3 for detailed quantification), with several intermediate and regional hospitals exhibiting high need due to their size and number of admissions per year.

Figure 2. Oxygen need estimation of the sampled 28 health facilities in Namibia



- The majority of the oxygen need is driven by Katutura Intermediate Hospital in Windhoek.
- Katutura Hospital's oxygen demand was estimated at ~3,151 cylinders/month, while Oshakati and Rundu Hospitals reported need of ~1,200 cylinders/month.
- District hospitals require an average of ~329 cylinders/month, with highest demand at Walvis Bay and Onandjokwe Hospitals.

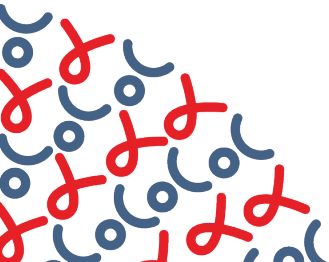
Supply, maintenance, and distribution landscape

Health facilities in Namibia operate both PSA plants and LOX tanks with the presence of global and other local companies that offer production, distribution, and storage services, as detailed below:

- **Liquid oxygen** is predominantly supplied by Afrox from their Air Separation Unit (ASU) plant in South Africa. In addition to its international operations, Afrox runs a cylinder filling station in Windhoek, Namibia, serving a mix of private and public health care facilities with LOX. Afrox also offers storage facilities and filling for cryogenic oxygen, which is imported through Cryo Africa for further distribution. Additionally, the ASU at Dundee Precious Metals in Tsumeb has a notable capacity of more than 330 tons per month. However, only about 25 percent of this capacity is utilized for the company's primary industrial needs, indicating a significant reserve of untapped spare capacity for LOX supply and highlighting potential avenues for expanding oxygen availability.
- **Afrox-owned LOX tanks at facilities:** During COVID-19, the USAID-funded Global Health Supply Chain Program—Procurement and Supply Management (GHSC-PSM) project funded the installation of LOX tanks and refills up to November 2023, at six key facilities through a lease agreement with Afrox.
- **PSA plants:** In 2010, Intakatech (aka Intaka) installed PSA plants on lease in 32 hospitals that later struggled to meet the increased demand during the pandemic. To improve capacity, the Government of the Republic of Namibia (GRN) planned to replace PSAs at all hospitals. At the time of the assessment, 13 newer PSA plants had been introduced, six of which were funded by the GRN and seven donated by USAID, the U.S. Centers for Disease Control and Prevention (CDC), The Global Fund, and others. However, during the site visits, the transition to the new PSAs at prioritized facilities was incomplete due to contractual and logistical barriers. At facilities like Rundu and Katima Muliro, the new PSAs were nonoperational pending the acquisition of spare parts and necessary maintenance.

Cost analysis of oxygen systems in health care facilities

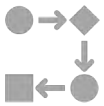
During our assessment of the 18 selected health facilities, we discovered a variety of oxygen production and storage technologies in place at each facility. Surprisingly, many facilities were paying significant rental fees for PSA plants and LOX tanks that were either unused or not operating at optimal capacity. To conduct a thorough evaluation, we examined each facility individually and calculated the monthly system costs associated with oxygen. This analysis allowed us to develop recommendations for investing in proprietary infrastructure rather than relying on rent-based assets. A few of these case studies are attached in Annex 4.



Other key findings

Oxygen sources: Multiple sources include PSA plants, LOX tanks, and cylinders. Roughly one-third of facilities deploy multiple PSA machines. The old PSAs struggle to meet the current demands, leading to purity and pressure issues. Breakdowns and long downtimes are common. LOX bulk tanks are underutilized due to price barriers, while heavy reliance on cylinders persists across all facilities.

Medical gas piping system network: While 83 percent of assessed facilities have medical gas piping systems and manifolds, only 12 percent reported them as fully functional due to leakages and inadequate maintenance. Oxygen outlet coverage is estimated at 35 percent of the patient beds.



Operations, procurements, and logistics: Stock-outs and disruptions in oxygen cylinders are widespread. Centralized procurement processes face delays for general commodities. Poor management of oxygen cylinders is observed in some facilities.

Quality assurance and quality control (QA/QC): Lack of normative standards, guidelines, and regulations for medical oxygen. There is no specific regulatory authority overseeing standards and certification processes for essential equipment.

Human resources (HR): Limited biomedical engineers and technicians who can maintain oxygen systems. Inadequate training on the equipment maintenance of oxygen systems exacerbates equipment challenges.

Oxygen equipment: Hospitals face shortages and breakdowns in patient monitors and pulse oximeters. On average, hospitals need 30 patient monitors, but only about half that number were available. Of the available monitors, up to 15 percent were nonfunctional. Similarly, only 35 percent of the required pulse oximeters were available per facility.

Diagnosis and treatment: The 2021 Namibia Essential Medicines List and 2021 Treatment guidelines highlight access to oxygen (O2) as vital, yet health worker adherence is challenged by the limited availability of oxygen and diagnostic equipment like oximeters and patient monitors.

Collaboration with government and other local stakeholders

EpiC Namibia deliberately and strategically leveraged opportunities for collaboration with the government and local stakeholders. At every stage of the project, from initiation to closure, progress meetings were conducted with government representatives, facilitating approvals for the sequential project activities such as kick-off, health facility assessment, review, approval, and dissemination of findings. This partnership reflected the shared commitment to addressing pressing needs.

EpiC met with **Africa Gas Solutions (AGS)**, a local company that developed a cutting-edge PSA prototype, boasting on-screen system access, integrated sensors, and comprehensive monitoring capabilities. For Onandjokwe Hospital (see photo on the right), AGS tailored a solution to incorporate medical air and vacuum systems into the PSA container, providing hospitals with holistic gas infrastructure. Utilizing both local and imported ISO-certified components, AGS has an in-house assembly process. To date, AGS has supplied more than 20 PSAs to both public and private hospitals.

PSA plant installed at Onandjokwe intermediate Referral Hospital and managed by AGS. Photo credit: AGS and MHSS Onandjokwe Intermediate Referral Hospital

EpiC engaged with the following two companies, among other stakeholders:

- **Dundee Precious Metals:** Dundee Precious Metals emerges as a promising avenue for addressing the supply requirements essential to operationalize LOX tanks and facilitate the distribution of oxygen cylinders. Situated in Tsumeb, Namibia's northern region, Dundee Precious Metals maintains two ASU facilities. These units possess production capabilities, boasting a combined capacity of up to 8 tons of liquid oxygen per day, with purity levels ranging from 95 percent to 97 percent.

  While Dundee Precious Metals currently lacks experience in producing medical-grade LOX, the company's management is proactively exploring opportunities to start producing medical-grade LOX. This initiative signals Dundee Precious Metals' readiness to adapt and contribute to critical health care infrastructure needs in Namibia. Furthermore, the recent acquisition of Dundee Precious Metals' smelter by Sinomine Resources prompts a close monitoring of developments within the company. This change in ownership brings forth new possibilities and potential synergies that could further enhance Dundee Precious

Metals' capacity and capabilities in supplying medical-grade LOX, thereby bolstering Namibia's health care system.

In essence, with its robust infrastructure and proactive approach to exploring opportunities in the medical-grade LOX market, Dundee Precious Metals stands poised to play a significant role in fulfilling the oxygen supply requirements vital for the enhancement of health care facilities in Namibia.

- **Air Gas, Namibia:** Air Gas is a local distributor and supplier of medical oxygen in Namibia. In a move to enhance its operations in the country, Air Gas acquired Air Liquide's operations in Namibia. This acquisition has positioned them as a key player in the local gas supply industry. They currently hold a distribution contract with Air Liquide, through which gases are imported from Botswana and South Africa for supply to various public and private health facilities. Air Gas is deeply committed to improving the pricing of medical oxygen in Namibia and has shown interest in partnering with local and foreign gas producers to make oxygen accessible and affordable in the country.

Results and Impact

Given Namibia's distinctive health care challenges, including a sparse population, hot, arid climate, and vast distances between health facilities, the project identified several options. These options included reaffirming government priorities and commitments to upgrade existing PSA systems, improving health facility reticulation, and investigating the feasibility of LOX production. The investment options included:

- **Fix the old PSA plants or invest in a bigger plant with a filling station**: Fixing the old PSA plants comes with the challenges of cost limits, obsolete brands/models, or unavailability of spare parts. Therefore, the GRN is pursuing a gradual PSA replacement strategy as a priority. As of April 2024, 13 new PSAs have already been procured and commissioned by the GRN and partners. The new PSA plants are expected to meet the facility need for directly piped beds, whereas the filling station could be employed to meet the need of wards requiring bedside cylinders.
- **GRN purchases its own LOX tank with a liquid-to-gas filling station (wherever applicable)** and establishes direct supply and maintenance contract with local gas producers when they become available. If more affordable medical-grade LOX becomes available from local producers, high-demand facilities like Katutura Intermediate Hospital, Walvis Bay Hospital, and Oshakati Hospital could consider purchasing their own LOX tanks. They could then utilize filling stations to supply nearby facilities, following a hub-and-spoke model. Below is an overview of several facilities that could potentially adopt such a model. While these assessments are preliminary, sourcing LOX locally could help establish a robust ecosystem within the country.

Hub facility	Hub need (in tpm)	Facilities in close proximity to the hubs	Spoke facility need (in tpm)
Katutura Hospital	32.1	Gobabis, Okahandja, Mariental	Up to 10
Walvis Bay Hospital	19.0	Swakopmund and nearby health centers	Up to 4
Oshakati Hospital	12.2	Engela, Eenhana	Up to 11
Rundu Hospital	12.4	Andara, Katima, Grootfontein	Up to 10

- **Leverage local partnerships:** Explore partnerships with local suppliers with strong presence and experience such as Air Gas, Africa Gas Solutions, Dundee Precious Metals, and AFROX to localize solutions and reduce costs and pricing for medical oxygen.
- **Manage LOX contract and pricing with Afrox:** Discuss long-term supply plans and strategies with Afrox to operationalize the bulk tanks at the six facilities—Walvis Bay, Tsumeb, Katutura, Oshakati, Gobabis, and Grootfontein Hospitals. These bulk tanks were decommissioned following the completion of the GHSC-PSM funding, and facilities have been paying rentals on these tanks since then. If Afrox is not willing to negotiate the pricing terms, the GRN should consider removal of the tanks.
- **Explore supply potential with Dundee Precious Metals:** Following consultations with the MHSS, EpiC is currently exploring re-engineering of the ASU units to meet the medical LOX quality norms. Based on the recommendations, medical LOX norms will be developed by the GRN, with the objective of strengthening local supply.
- **Revisit facility/PSA contracts with Intaka:** The MHSS should conduct a comprehensive evaluation of the Intaka PSA maintenance contracts to address the issue of malfunctioning plants. This evaluation should aim to either repair the broken plants or enhance the regulations governing preventive and corrective maintenance. Given that the terms and conditions of these contracts were established around 2014, it is imperative to update them. This update should include provisions for retiring or repairing PSAs that are older than 10 years and installing larger units to meet the increasing demand.
- **Fix medical gas piping system networks**: Replace or fix leakages in medical gas piping system networks to improve coverage within all of the hospitals to facilitate centralized oxygen delivery. None of the 18 facilities visited had a robust, fully functional medical gas piping system. Hence, the GRN/MHSS should carry out an assessment of piping networks and consider having regular repair and maintenance regimes.
- **Strengthen HR systems, training, and spare parts procurement**: In addition to addressing infrastructural challenges, the MHSS should also prioritize systematic challenges related to HR systems, training initiatives, and spare parts procurement. An assessment of existing HR systems is required to ensure equitable distribution of biomedical engineering personnel across regions, with the MHSS establishing

troubleshooting protocols and maximum turnaround times. Regarding training and development, the MHSS should devise a schedule for refresher courses and consider implementing a training-of-trainers model to effectively reach lower-level facilities. In terms of spare parts, it is essential to establish robust contracts with vendors and incorporate spare parts provision throughout the service period. To effectively implement these strategies, a monitoring mechanism must be in place to guarantee sustainability.

"We are excited about the recommendations concerning system costing and intend to use the findings to advise facilities on optimizing their oxygen production and storage solutions. We would welcome the opportunity to collaborate with health partners on implementing other recommendations, provided that additional implementation funds become available."

—MHSS representative

Reflections and Lessons Learned

To establish sustainable markets for access to medical oxygen in Namibia, local production of LOX is crucial to ensure affordability and economic viability. Equally important is the optimization of existing PSA operations and medical piping systems. Given Namibia's relatively small population, it is imperative to also consider the broader industrial gas needs, extending beyond the medical sector at both national and regional levels. Leveraging these industrial gas requirements can improve the availability and affordability of medical liquid oxygen, particularly given the country's low population density.

The collaboration and support between the GRN and the EpiC project throughout the various project stages were instrumental in the program's success. As final recommendations, the GRN proposed the inclusion of a study component to gather and analyze clinical data on hypoxemia and its management across facility levels. Additionally, allocating a budget to support the implementation of recommendations arising from this assessment was another need expressed by the MHSS stakeholders.

Annex 1. List of stakeholders consulted for qualitative review

Stakeholder, location	Relevance/role
Health/implementation partners	
Ministry of Health, Windhoek	Understanding of priority facilities and intervention areas
Chemonics, Windhoek	Leverage lessons and resources from the USAID liquid oxygen project
Right to Care, Namibia/South Africa	Lessons from the oxygen infrastructure assessments in 2022–23
Oxygen suppliers, distributors, and engineers	
Africa Gas Solutions, Windhoek	PSA plants engineering—existing network, lessons learned, and local context
Afrox, Windhoek	LOX pricing and existing tanks at six locations in Namibia
Air Gas, Windhoek	Distribution network and country vision
Dundee Precious Metals, Tsumeb	Potential to supply medical LOX and expand portfolio

Annex 2. List of facilities with LOX tanks installed under the GHSC-PSM project

Facility name	Tank capacity
Walvis Bay Hospital	6.5 ton
Tsumeb Hospital	6.5 ton
Katutura Hospital	20 ton
Oshakati Hospital	2 units x 6.5 ton
Gobabis Hospital	4.5 ton
Grootfontein Hospital	4.5 ton
Katutura Hospital (NIP)	4.5 ton

Annex 3: Quantification of the sampled facilities

Facility name	Facility type	Total number of beds	Estimated O2 need (liters/month)	Estimated O2 need (tpm)
Katutura Intermediate Hospital	Regional referral hospital	1,100	22,488,742	32
Walvis Bay District Hospital	District hospital	216	13,291,432	19
Rundu Intermediate Hospital	Regional referral hospital	453	8,702,330	12
Oshakati Intermediate Hospital	Regional referral hospital	1,077	8,520,190	12
Onandjokwe District Hospital	District hospital	556	7,123,981	10
Engela District Hospital	District hospital	247	4,008,384	6
Tondoro Health Centre	Health center	12	3,724,057	5
Outapi District Hospital	District hospital	220	2,873,649	4
Swakopmund District Hospital	District hospital	196	2,809,051	4
Gobabis District Hospital	District hospital	239	2,737,638	4
Andara District Hospital	District hospital	144	2,563,408	4
Eenhana District Hospital	District hospital	196	2,159,024	3
Keetmanshoop District Hospital	District hospital	163	2,120,603	3
Katima Mulilo District Hospital	Regional hospital	518	2,050,186	3
Mariental District Hospital	District hospital	163	1,908,666	3
Okahandja District Hospital	District hospital	60	1,820,535	3
Grootfontein District Hospital	District hospital	124	1,583,611	2
Opuwo District Hospital	District hospital	146	1,148,465	2
Tsandi District Hospital	District hospital	52	1,006,196	1
Okongo District Hospital	District hospital	147	908,542	1
St. Mary's Rehoboth District Hospital	District hospital	201	765,213	1
Omuthiya District Hospital	District hospital	89	638,068	1
Okakarara District Hospital	District hospital	61	582,584	1
Omaruru District Hospital	District hospital	80	520,378	1
Luderitz District Hospital	District hospital	113	445,459	1
Okahao District Hospital	District hospital	151	407,072	1
Tsumeb Private Hospital	District hospital	8	127,850	0
Mangetti Dune Health Centre	Health center	25	105,860	0

Annex 4. Systems cost analysis—facility case studies

CASE STUDY 1

Katutura Intermediate Hospital

1,100-bedded hospital in Windhoek

1x

- **Intaka-managed PSA plant** installed before 2014
- Plant reported to be **not running at optimal purity, pressure** – challenges in accessing machines

2x

- **AFROX-owned LOX tanks** installed during C19
- **20-ton tank unused** due to high pricing, but still paying rent.
- **4-ton tank** refills funded by USAID/ Chemonics upto Nov 2023

Total estimated need: **22.5 million litres/ per month**

PSA plant @ 500L/min i.e. 21.6 million L/month	
Monthly rental to Intaka	$ 15,000
Electricity charges	$ 2,935
Total monthly cost	**$ 17,935**
LOX tank @ 17.14 million L capacity	
Refill cost	$ 32,340 ($ 1,320/pt)
Monthly rental to Afrox	$ 710
Total monthly cost	**$ 33,050**

Potential solutions:

- **Fix PSA plant or invest in a bigger plant** with a filling station (e.g.: Africa Gas Solutions)
- **Buy own LOX tank + liquid-to-gas filling station** with direct supply and maintenance contract with Dundee Metals

CASE STUDY 2

Walvis Bay District Hospital

216-bedded hospital in Walvis Bay (West Namibia)

2x

- **1x Intaka-managed PSA plant** installed before 2014
- Plant reported to be **not running at optimal purity and pressure**
- **1x Africa Gas Solution managed PSA plant;** able to produce 436 L/min

1x

- **AFROX-owned LOX tank** installed during C19.
- **4.5-ton tank unused** due to high pricing, but still paying rent.

Total estimated need: **13.3 million litres/ per month**

PSA plant @ 436L/min i.e. 18.8 million L/month	
Monthly rental/ maintenance	$ 1,400*
Electricity charges	$ 4,266
Total monthly cost	**$ 5,666**
LOX tank @ 3.14 million L capacity	
Refill cost	$ 8,247 ($ 1,832/pt)
Monthly rental to Afrox	$ 500*
Total monthly cost	**$ 8,747**

Potential solutions:

- **Fix PSA plant and connect PSA with all critical ward;** install a filling station
- **Buy own LOX tank as primary source/ backup** with direct supply and maintenance contract with Dundee Metals

*Assumption based data collected from similar other facilities data

CASE STUDY 3

Oshakati Intermediate Hospital

1,077-bedded hospital in Oshakati (North Namibia)

1x

- **1x Intaka-managed PSA plant** installed
- Plant reported to be **not running at optimal purity and pressure**
- Able to produce ~250 L/min*

2x

- **AFROX-owned LOX tanks** installed during C19.
- **Both 6.5-ton tanks unused** due to high pricing, but still paying rent.

Total estimated need: **8.5 million litres/ per month**

PSA plant @ 250L/min i.e. 10.8 million L/month	
Monthly rental/ maintenance	$ 5,600
Electricity charges	$ 2,446
Total monthly cost	**$ 8,046**
LOX tank @ 9.1 million L capacity	
Refill cost	$ 19,500 ($ 1,500/pt)*
Monthly rental to Afrox	$ 790
Total monthly cost	**$ 20,290**

Potential solutions:

- **Fix PSA plants and connect PSA with all critical ward;** install a filling station
- **Buy own LOX tank as primary source/ backup** with direct supply and maintenance contract with Dundee Metals or Zamibia

*Assumption based data collected from similar other facilities data

CASE STUDY 4

Rundu Intermediate Hospital

453-bedded hospital in Rundu (North Namibia)

3x

- **2x Intaka-managed PSA plants;** plants not running at optimal purity and pressure levels
- **1x PSA donated by CDC only for the isolation ward** (construction incomplete)
- **Repair and maintenance contracts are challenging**, and hence bed-side cylinders used as the primary supply source
- Hospital management **not trained on using PSA technology**

Total estimated need: **8.7 million litres/ per month**

PSA plants @ Intaka managed & CDC donated	
Monthly rental/ maintenance	$ 655
Electricity charges	$ 5,000*
Total monthly cost	**$ 5,655**

Potential solutions:

- **Fix PSA plants** managed by Intaka and **conduct pressure test** of the medical gas pipeline system
- **Consider utilisation of CDC-donated PSA plant** for wards other than isolation
- **Ensure repair and maintenance** contract for the new PSA; BME engineer to manage the filling station
- **Consider buying own LOX tank (~10-ton)** with potential supplies from Dundee Metals or suppliers in Zambia

*Assumption based data collected from similar other facilities data

Annex 5. Facilities assessment tool

SECTION I: IDENTIFICATION			
NO.	**QUESTION**	**RESPONSE**	**Comments**
ID1	PROVINCE NAME		
ID2	FACILITY TYPE		
ID3	FACILITY NAME		
ID4	NAME OF FACILITY IN-CHARGE		
ID5	CONTACT NUMBER OF FACILITY IN-CHARGE		
SECTION II: FACILITY-WIDE QUESITONS			
Instructions: In this section of the survey, you will answer questions about the overall facility and the oxygen sources available.			
NO.	**QUESTION**	**RESPONSE**	**Comments**
OX1	TOTAL NUMBER OF FUNCTIONAL BEDS IN THE FACILITY	……. beds	
OX2	DOES THIS FACILITY PROVIDE OXYGEN TO PATIENTS?	Yes.....1 No 0	
OX3	WHAT OXYGEN SOURCES ARE AVAILABLE AT THIS FACILITY? *Read all options aloud. Select all that apply.*	Oxygen concentrators.....1 Oxygen cylinders (directly to patients).....2 Cylinder manifold piped to a department/ward.....3 PSA plant (piped directly to department/ward or for filling cylinders) 4 Liquid oxygen (piped directly to department/ward or for filling cylinders).....5 Other (specify) _____-222	
OX4	HOW MANY PSA PLANTS/INTAKA ARE AT THIS FACILITY?	No. Of INTAKA/PSA plants …… __	
OX5	IS THE PSA PLANT CURRENTLY FUNCTIONAL? DOES THE PSA PLANT HAVE REFILLING CAPACITY? SPECIFY DETAILS.	Yes.....1 No 0	
OX6	PLEASE ENTER PSA PLANT DETAILS DAILY RUNNING AVERAGE HOURS AND RENTAL CHARGES?	Capacity: …….. m3/hr No. of daily running: …….. hrs Monthly rental charges NAD $……	
OX7	IS THERE LIQUID OXYGEN TANK CURRENTLY AVAILABLE IN THE TANK?	Yes.....1 No 0	
OX8	SPECIFY DETAILS OF THE LIQUID OXYGEN TANK, IF AVAILABLE:	Capacity: …….. Liters/Tonnes Frequency of refills: …….. Monthly rental charges NAD $……	
OX9	HOW ARE OXYGEN CYLINDERS SOURCED IN THE FACILITY?	Need-based deliveries from nearby suppliers (ask for list of suppliers and pricing).....1 Pooled procurement contracts (directly with the supplier – check refill pricing).....2 National pooled procurement contracts at the central level (ask for refill pricing).....3 From another/nearby health facility.....4 Don't know .....-888 Other (specify) .....-222	
OX10	SPECIFY THE NAME OF THE CYLINDER SUPPLIER.	……__	
OX11	DOES THIS FACILITY KEEP A LOGBOOK FOR CYLINDERS?	Yes .....1 No 0	
OX12	WHEN WAS THE LAST TIME YOU GOT A CYLINDER REFILLED?	Within the last 30 days.....1 1-3 months before.....2 4-6 months before.....3 No record/receipt within the last 6 months .....-888	
OX13	IF 1,2, OR 3 IN OX13, WHAT SIZES OF CYLINDERS WERE REFILLED?	9.5 kg…… 5.5 kg…… 4.2 kg…… 2 kg…… 1 kg…… 0.5 kg……	

OX14	How many cylinders does the facility use on a monthly basis?	9.5 kg…… 5.5 kg…… 4.2 kg…… 2 kg…… 1 kg…… 0.5 kg……	
OX15	What was the price (in NAD) you paid for refilling the cylinders?	9.5 kg…… 5.5 kg…… 4.2 kg…… 2 kg…… 1 kg…… 0.5 kg……	
OX16	Do you ever send cylinders for use in patients' home for in-home care/treatment?	Yes ..... 1 No .....0 Don't know.....-888	
OX17	Does the facility have internet connection? If Yes, do you have backup?	Yes ..... 1 No 0	
OX18	How many functional ambulances does this facility have? Functional means that the vehicle can safely transport patients if fuel and a driver are available.	No. Of functional ambulances _____	
OX19	If facility has one or more functional ambulances: How many functional ambulances are equipped with oxygen?	No. Oxygen-equipped functional ambulances _____	
OX20	Does this facility keep records on the numbers of admissions and deaths each month?	Yes ..... 1 No 0	
OX21	If the facility is tracking admissions: Total number of Inpatient Admissions	2022:	
OX22	Who at the facility is primarily responsible for entering data into DHIS2?	Statistics Unit (dedicated staff for DHIS2) ..... 1 Administration Team ..... 2 Finance Team ..... 3 Head Nurse/Doctor..... 4 Biomedical Engineer ..... 5 Other (specify).....-222	

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