Project BOXER and Capacity Building

31 August 2023
### Agenda

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<th>Topics</th>
<th>Presenters</th>
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<tr>
<td>1. <strong>Introduction</strong></td>
<td>Elizabeth Hamilton</td>
<td>5 min</td>
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<td>2. <strong>Medical Oxygen Training Program:</strong> Project BOXER and Capacity Building</td>
<td>Andrew Johnston and Jen Morin</td>
<td>25 min</td>
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<td>3. <strong>Q&amp;A</strong></td>
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<td>30 minutes</td>
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Medical Oxygen Training Program
Project BOXER and Capacity Building
Medical Oxygen Training Program

Project BOXER Training and Capacity Building
Project BOXER: TA for C19RM Bulk O2 Investments

Project Scope/Objective: To provide technical assistance (TA) that will support the implementation, monitoring and oversight of Pressure Swing Adsorption (PSA) plants and relevant Global Fund oxygen investments to ensure sustainability and maximized impact of increased global oxygen capacity.

TA Provider: Build Health International (BHI)

Who is BHI?
A design-and-build nonprofit dedicated to delivering dignified, high-quality healthcare solutions in low-resource settings throughout the world.

Project BOXER is providing technical assistance to 50 out of 59 countries procuring PSA plants via C19RM
Project BOXER Info Session

Topic: PSA Plant Training Programs

Presenter: Andrew Johnston, Director of Medical Oxygen Education and Training, Build Health International

As Director of Medical Oxygen Education and Training, Andrew works with the BHI oxygen team to provide accessible, engaging, and thorough training for countries with existing or incoming oxygen plants. Andrew has two decades of international development experience and studied international education, adult development, and community mobilization at Harvard. On Project BOXER, he applies his experience and education to build local capacity to operate and maintain lifesaving medical oxygen infrastructure. Andrew follows the rapidly evolving training needs of Project BOXER partners and works with BHI’s Project BOXER team to develop effective trainings that make complex concepts understandable. In doing so, he seeks to empower Project BOXER stakeholders to sustainably maintain their PSA plants and oxygen delivery systems.
Project BOXER Info Session

**Topic:** PSA Plant Training Programs

**Presenter:** Jen Morin, Mechanical Engineer and Project BOXER Focal Point, Build Health International

Jen is a Mechanical Engineer serving as one of Build Health International’s focal points for Project BOXER. Her primary focus is the development of oxygen plant specification recommendations in partnership with the Principal Recipients of the Global Fund’s oxygen grants. As more plants move from specifications development to site preparation and capacity building, Jen has dedicated a portion of her time to the development of management materials for Project BOXER. She helped to lead two management trainings in Sierra Leone and Timor-Leste and will be leveraging her experience with these Project BOXER trainings to address future training requests from countries looking to receive training through Project BOXER.
Information Session Outline

1. Why Project BOXER Training?
2. Overview of Project BOXER Training
3. Ongoing Support
4. Training Process
5. Training Request Form
6. Questions and Answers (~30 mins)
Why Training?

The Situation

- In most health systems receiving PSA Plants, biomedical technicians lack adequate knowledge of how to maintain and safely operate PSA plants or oxygen delivery systems.
- Senior leadership is often unprepared to successfully and sustainably integrate PSA plants into health systems and hospitals.
- PSA plants are challenging to maintain and include components that are not found in other hospital equipment.
- Critical biomedical equipment maintenance management systems are historically overlooked.

Observed Consequences

- Staff could not operate or maintain the plants.
- Short useful life of new PSA plants. Frequent breakdown and unnecessary damage.
- Lack of spare parts meant broken plants could not be repaired.
- Oxygen safety was not adequately addressed. Serious accidents.
- Frequent interruptions in the oxygen supply.
- Significant losses in investment.
- Reliance on expensive commercial O2 sources when PSA plants broke down.
- Dependency on service contracts.
- Inability to perform maintenance after service contract ends.

Our Recommendation

- Training and capacity building
  Health systems with internal knowledge of PSA plants maintain oxygen access because they are far better positioned to:

  - Address PSA plant underperformance
  - Manage their service contracts
  - Continue PSA plant maintenance after service contract ends
BHI’s Medical Oxygen Program

BHI developed a **PSA plant and oxygen delivery training** curriculum in **early 2022**. Over the past year, BHI has trained **over 558 biomedical engineers, technicians, and facilities maintenance staff**.

BHI has delivered training in **Burkina Faso, Cameroon, Guinea, Lesotho, Liberia, Mali, Nepal, Rwanda, Sierra Leone, and Sudan**.

**Three types of oxygen training** are available to **C19RM recipients** as a part of **Project BOXER**:

1. Management Training
2. Maintenance Training
3. Training of Trainers (Advanced Maintenance)

All trainings are available in **English and French**!

*Other languages may be possible upon request.*
Project BOXER Training and Supplier Training

During the installation of a new PSA plant, suppliers conduct a training for site staff. However the quality of these trainings can vary. An additional Project BOXER training reinforces key concepts and emphasizes important practices to maintain an efficient PSA plant. The Project BOXER training consists of the following benefits:

- More Comprehensive: Length of training 5 days instead of 1-3 days
- Technical Detail: Increased level of depth and detail, pulling from BHI’s observations from our work in over 25 countries
- Neutral: Brand-neutral and impartial
- Safety: Strong emphasis on medical oxygen safety and risk mitigation
- Long-term Sustainability: Focused on capacity building for sustainability
- Experience and Lessons Learned: Share lessons learned from accidents and repairs
- Post-training Support: Ongoing engagement through virtual support and community of practice
<table>
<thead>
<tr>
<th>Level of Expected PSA Knowledge</th>
<th>Length</th>
<th>Target Audience</th>
<th>Recommended Timing</th>
<th>Training Objective</th>
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<tbody>
<tr>
<td><strong>Management Training</strong></td>
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<tr>
<td>No Prior Knowledge</td>
<td>2 Days</td>
<td>MoH leadership, Hospital Directors and Senior Management</td>
<td>Prior to installation or commissioning</td>
<td>Ensure that senior management is fully briefed on the function and operating requirements of PSA plants including maintenance and safety. Health sector leadership is prepared to successfully integrate new PSA plants and oxygen delivery equipment into health systems.</td>
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<tr>
<td><strong>Maintenance Training</strong></td>
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<tr>
<td>Beginner</td>
<td>5 Days</td>
<td>Biomedical Engineers &amp; Technicians, Facilities Managers, Hospital Operations Staff</td>
<td>Immediately after installation or commissioning</td>
<td>To prepare biomedical engineers, technicians, facilities managers, and plant operators to safely and sustainably operate and maintain PSA plants by providing the knowledge and building the skills necessary to: implement daily and ongoing preventive maintenance, perform daily maintenance check, and troubleshoot and conduct routine repairs.</td>
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<tr>
<td><strong>Training of Trainers</strong></td>
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<tr>
<td>Intermediate</td>
<td>5 Days</td>
<td>Experienced Engineers or Technicians with Supervisory or Training Roles</td>
<td>After commissioning, once master trainer candidates have been identified</td>
<td>To empower advanced technicians to train others on PSA plants and to conduct complex maintenance and repairs independently. An advanced version of the maintenance training that prepares experienced engineers and technicians to conduct more sophisticated maintenance, troubleshooting, and repair of PSA plants.</td>
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Two Day Training

No Experience Required

Objective: To ensure that senior management is fully briefed on the function and operating requirements of PSA plants including maintenance and safety. Health sector leadership is prepared to successfully integrate new PSA plants and oxygen delivery equipment into health systems.
Management Training - Approach

- **Classroom sessions** to build conceptual understanding of PSA plants and oxygen delivery systems
- Briefing on **budgeting, human resources, supply chain, warranty, service contracts**
- **Site visit** to PSA plant for practical, hands-on learning
- Videos and case studies to raise awareness for medical **oxygen safety and risk mitigation**
- Review of plant operator **daily checklists** to familiarize management with deliverables
- **Examples** of circumstances that led to plant failures from BHI’s **Find & Fix work**
- Discussion of **spare parts** and **preventative maintenance**
Management Training - Classroom Sessions

Topics Include:

- Introduction to medical oxygen and PSA plants
- Safety and hazard mitigation
- Overview of PSA components and function
- Find and Fix observations and Lessons Learned
- Operating requirements for PSA Plants
- Overview of PSA plant maintenance
- Human Resources including staffing requirements and capacity building for PSA Plant Maintenance
- Budgeting for PSA operations, oxygen delivery, and maintenance
- Looking ahead - PSA plant management for sustainable oxygen supply

Sierra Leone Senior Management Training: A health sector leader poses a question during the Budgeting for PSA Operations module.
Maintenance Training

Objective: To prepare biomedical engineers, technicians, facilities managers, and plant operators to safely and sustainably operate and maintain PSA plants by providing the knowledge and building the skills necessary to:

- implement daily and ongoing preventive maintenance.
- perform daily maintenance check.
- troubleshoot and conduct routine repairs.

Biomedical Engineers and Technicians

Facilities Managers

Hospital Operations Staff
Maintenance Training - Approach

- **Classroom sessions** to provide a detailed, technical description of PSA plants and oxygen delivery systems.
- **Site visits** to PSA plants for practical, hands-on learning.
- **Pre-training, daily, and post-training learning assessments.**
- **Adaptation** of a BHI-designed daily checklist and preventative maintenance plan to specific PSA plants.
- **Development of an online community of practice** for ongoing technical support and engagement.
Maintenance Training - Highlights

Practical Sessions
- Trainees have the opportunity to hone existing skills and apply concepts learned in classroom sessions, learn tips and techniques from instructors, and gain experience with PSA plant components that may not be present in their own plant.

Assessments
- Participants will take daily assessments during the training, beginning with a pre-training assessment and ending with the post-training assessment. These are designed to help BHI instructors gauge learning, address any weak areas, and provide remediation during the training.

Materials
Maintenance Training Highlights

Rwanda: Steve Mtewa teaching about a component in the oxygen booster compressor.

Rwanda: Trainees taking their daily assessment.

<table>
<thead>
<tr>
<th>Repair Log</th>
<th>Maintenance Log</th>
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<tbody>
<tr>
<td>Component</td>
<td>Date</td>
</tr>
<tr>
<td>Dismantle</td>
<td></td>
</tr>
<tr>
<td>Reassemble</td>
<td></td>
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<tr>
<td>Test on site</td>
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<table>
<thead>
<tr>
<th>Preventive Maintenance Log</th>
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<tbody>
<tr>
<td>Component</td>
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<tr>
<td>Dismantle</td>
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<tr>
<td>Reassemble</td>
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<tr>
<td>Test on site</td>
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<tr>
<td>Inspection</td>
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Ongoing Virtual Support

Ongoing Support: Each training cohort is invited to joining a country-specific WhatsApp community of practice where trainees can:

- Ask Project BOXER technical assistance team and other trainees for troubleshooting advice and crowdsource ideas.

- Keep each other accountable to stay up to date by sharing daily checklists, preventative maintenance logs, and repair logs.

- Stay in touch with other biomedical engineers, technicians, and managers.

- Stay connected for additional Project BOXER resource releases.

Liberia: The Liberian Biomedical Engineer/Technician virtual support group. Left: Phebe Oxygen Plant thanking BHI’s Steve “Grandpa” Mtewa for his assistance. Right: Operators from JFD Oxygen teamed up with Phebe Oxygen Plant and were able to assist one another in troubleshooting and solving a motor issue at JFD.
Training of Trainers

Intermediate/Advanced Level

Objective: To empower advanced technicians to train others on PSA plants and to conduct complex maintenance and repairs independently. An advanced version of the maintenance training that prepares experienced engineers and technicians to conduct more sophisticated maintenance, troubleshooting, and repair of PSA plants.
Training of Trainers (Advanced Training) - Approach

- **Customized agenda based on needs.** Agenda can focus on training of trainers (TOT) or on advanced training on PSA plant maintenance and repair.
- **TOT classroom sessions** to prepare trainers to provide technical training on PSA plants and oxygen delivery systems
- **Advanced practical training** in PSA plant maintenance and repair with a focus on complex components such as the air compressor or the booster compressor
- **Site visits** to PSA plants for practical, hands-on learning
- Trainees take an increased role in the training by delivering supervised practical and theoretical lessons.
- **Theoretical and practical pre-training, daily, and post-training learning assessments**
- Development of an online community of practice for ongoing technical support and engagement
- **Support developing a training curriculum** and conducting onsite training, if applicable
Training of Trainers - Classroom Sessions

Topics include:

- Introduction to medical oxygen and PSA plants
- Overview of PSA components and function
- Safety and hazard mitigation
- Air compression and purification
- PSA oxygen generator
- Oxygen booster pump
- Principles of PSA plant operation
- Oxygen delivery systems
- Find and Fix observations and lessons learned
- PSA plant maintenance checklists and planning

Nepal: Pedro Castro and advanced training candidate comparing PSA and liquid oxygen plants
Active post-training support is essential to helping trainees build skills and increase independence, as well as keeping PSA plants functioning. Ongoing support is a key contributor to PSA plant sustainability.

Monitoring and ongoing support through Project BOXER can include:

- Virtual support from Project BOXER technical assistance team.
- Access to closed Whatsapp chat group or other platform.
- Community of practice (technicians supporting other technicians).
- Scheduled check in calls (individual or group).
- Access to online content.
- Refresher training.
Project BOXER Training Process: Planning

1. PR submits a formal request for training by completing the Training Request Form.
2. BHI schedules a consultation within two days of receiving training request.
3. BHI and PR meet to discuss the specific training needs.
4. BHI holds coordination calls with PRs and, as needed, with other in-country stakeholders, to refine needs and strategy for the trainings.

Following the consultation, the BHI team handles the following logistics:

- Developing Terms of Reference and strategy for the training.
- Presenting training materials and provides hands-on training with the PSA plant.
- Providing trainees with copies of training materials.
- Awarding certificates to trainees at the completion of the training.

The Principal Recipient (PR) is responsible for remaining logistics, including (but not limited to):

- Identifying a venue for the training.
- Sending invitations to trainees and confirms attendance prior to training.
- Arranging lodging and transportation for trainees, if required.
- Arranging per diems and transport payments for trainees.
- Providing refreshments during training.
The following training costs are covered by the Global Fund through Project BOXER:

1. BHI’s costs (staff time, flights, accommodations, etc.)
2. Training materials
3. Training certificates
4. Visibility and communications items (i.e. banners, signage)

The PR is responsible for the in-country training costs including:

1. Venue
2. Trainee lodging and meals
3. Transportation (to venue, PSA plant, etc.)
4. Trainee per diems
# Project BOXER Training Process: Timeline

<table>
<thead>
<tr>
<th>Training Consultation</th>
<th>Training Planning and In-Country Logistics</th>
<th>Project BOXER On-Site Training</th>
<th>Post-Training Survey</th>
<th>Post-Training Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project BOXER team and PR meet to determine unique needs. With introductions from PR, Project BOXER team engages with other oxygen partners in-country.</td>
<td>Project BOXER team prepares strategy and Terms of Reference. PR arranges venue, identifies and invites trainees.</td>
<td>Management, maintenance, and/or advanced in-country training takes place.</td>
<td>Project BOXER team requests feedback from trainees.</td>
<td>Project BOXER provides virtual coaching, follow-up, and ongoing support.</td>
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</table>

## 4-6 weeks

Time from consultation to Project BOXER on-site training will depend on how quickly arrangements can be made in-country and the availability of the Project BOXER trainers.
Training Request Form

Following this information session, this form will be circulated via email to all Principal Recipients.

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
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<tbody>
<tr>
<td>Do you have training plans already established? For example, training provided by the supplier or by other partners? If you are going to receive training from the supplier, who is this supplier?</td>
<td></td>
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<tr>
<td>Your answer</td>
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<tr>
<td>Are there any special circumstances that BHI and TGF need to be aware of?</td>
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<tr>
<td>Your answer</td>
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<tr>
<td>IMPORTANT: Training at the PSA plant requires a lot of administrative preparation. A BOXER project training will take place more quickly if the PR and its partners in the country are able to organize the main aspects of the training, including the location of the training, the transport of the training participants, the per diems participants, meals for participants during the training, and transportation of participants and trainers to PSA plants for hands-on sessions during the training. Please indicate your ability to support these aspects of the training.</td>
<td></td>
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<tr>
<td>- We are able to arrange all aspects of training mentioned above.</td>
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<tr>
<td>- We need to discuss this during the consultation.</td>
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</table>

After this form is submitted, the Project BOXER team will contact the PR within two business days to arrange a consultation. In that meeting, we will discuss unique training needs (hospitals to receive training, number of trainees, etc.)
Thank you!
Interested in a Project BOXER Training?

Scan the QR code below to let us know
www.BuildHealthInternational.org

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Beverly, MA 01915, USA
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