



Final Impact Assessment Study Report

Support for supply, installation, testing, and commissioning of 12 PSA oxygen plant at various locations

GAIL (India) Limited

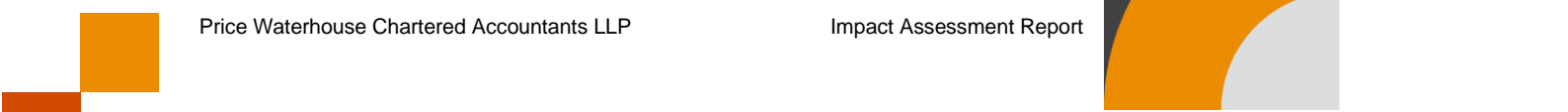
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Price Waterhouse Chartered Accountants LLP



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List of Abbreviations

Abbreviation	Full Form
AMC	Annual Maintenance Contract
CMO	Chief Medical Officer
CSR	Corporate Social Responsibility
FY	Financial Year
ICU	Intensive Care Unit
IDI	In-Depth Interview
INR	Indian Rupee
IPD	In-Patient Department
IRECS	Inclusiveness, Relevance, Effectiveness, Convergence, Sustainability
JEE	Joint Entrance Examination
LLP	Limited Liability Partnership
LPM	Litres Per Minute
MO	Medical Officer
NA	Not Applicable
NEET	National Eligibility Entrance Test
PSA	Pressure Swing Absorption
PSU	Public Sector Undertaking
PW	Price Waterhouse
PWCALLP	Price Waterhouse Chartered Accountants LLP
SDG	Sustainable Development Goal
TB	Tuberculosis
UN	United Nations

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1. Executive Summary

About the project:

GAIL (India) Ltd (GAIL) is a Central Public Sector Undertaking (PSU) that started its operations in 1984. It implements CSR projects across various sectors and is committed to conducting impact evaluations of its projects. One of these projects is the 'Support for supply, installation, testing, commissioning of 12 PSA oxygen plants' at various locations such as Uttar Pradesh, Karnataka, Madhya Pradesh, and Rajasthan in 2021.



GAIL engaged Price Waterhouse Chartered Accountants LLP (PWCALLP) to conduct the impact assessment of this CSR project. The scope of work included the desk review of the project, research tools development, field data collection and providing management with key findings and recommendations for their consideration.



The impact assessment study utilised qualitative approach. As a part of this, PWCALLP interacted with various project stakeholders such as GAIL Nodal Officer, Chief Medical Officer / Facility Administration (from each of the hospital visited), Doctors and Nurses to gauge their interest and perspective on the impact created by project activities.



Key Impact Findings:

Disaster Response & Emergency Preparedness:

- Due to the increased capacity and continuous supply of Oxygen, hospitals were able to cater larger population of patients. One of the hospitals supported under this project i.e. TB Hospital Prayagraj stated that **their referral rate has been reduced** as they are now confident to cater serious cases due to continuous oxygen supply.
- **Beds in the hospital wards are now connected** with head panel oxygen supply unit **with uninterrupted supply of oxygen and are easy to operate.**

Strengthening Health Infrastructure:

- Kundapura Hospital in Udipi district was turned into a COVID centre, and it was noted that this 170 bedded hospital was fully dependent on the oxygen plant.
- Due to strengthened medical infrastructure, hospitals were **able to cater patients suffering from severe stages of Haemoptysis, Pulmonary Edema and Empyema** which was not the case earlier.
- Though the project has supported the maintenance of 3 years through vendors, hospital administration across location shared the need of an annual maintenance contract (AMC) to be drawn for them (after the support), as the plants are highly technical and requires only trained specialists for any major inconsistencies observed.

Access to Quality Treatment at no Extra Cost:

- Project was able to provide **cost intensive support of oxygen supply** to all sections of society which **otherwise would have costed them between INR 1,000/- to 2,000/- (average) per day basis in other nearby private hospitals**, as reported by multiple doctors across different health facilities.
- Due to the support of oxygen plant the per patient expenses has been reduced significantly.

Positive Impact on Community:

- Oxygen plants can **certainly contribute to case of emergency and can supply medical grade oxygen to other nearby health facilities (primary health centres or sub centres).**
- It was also important to note that PSA Oxygen plant is a 'clean technology' as the raw material it uses to generate medical grade oxygen is the ambient air, making it environment friendly.



Recommendations:

- **Supporting the larger Ecosystem:** Considering the nature of support, these hospitals are now equipped with sustainable source of oxygen supply. Hence, such hospitals can further tie-up with nearby Primary Health Centre (PHC) and Community Health Centre (CHC) for providing continuous and uninterrupted supply of additional oxygen cylinders and eliminating the reliability on private counterparts.



- **Provisioning of Annual Maintenance Contract (AMC):** Hospital administration appreciated the services provided by GAIL and vendors during the warranty period. However, it is suggested that AMC should also be drawn well in advance beyond 3 years as due to some technicality failure or service-related issue the plants may not work and that can impact the patients as well as credibility of the government hospitals. This can be done by drafting contractual arrangements in advance between vendors and government hospitals so that hospitals can reach out to these vendors independently and take support for necessary repair and maintenance.





2. Introduction

1.1. CSR at GAIL (India) Limited

GAIL (India) Ltd (GAIL) started its operations as a **Central Public Sector Undertaking (PSU)** in 1984. It was established under the Ministry of Petroleum and Natural Gas, Government of India. It is India's leading natural gas company with ownership and network of over 15,500 kms of natural gas pipelines across the country. It holds **~70% market share in gas transmission** and **accounts for over ~ 50% of gas trading** in India.¹

In line with the company's vision, GAIL continues to enhance value creation in the society and in the communities in which it operates. The company aims to fulfil its role as a socially responsible corporate entity with environmental concerns with an objective to promote sustained growth for the society and the community.² The goal is to ensure an increased commitment at all levels in the organisation to operate business in an economically, socially & environmentally sustainable manner, while recognising the interests of all its stakeholders

Corporate Social Responsibility (CSR) projects at GAIL encompass a wide range of welfare and developmental activities that extend across various focus areas, primarily conducted in and around its business operations. The company has identified **seven focus areas** which remain at the heart of all GAIL's CSR projects and have been appropriately termed as '**GAIL Hriday**' as depicted in the figure below.³

Figure 1: GAIL CSR Focus Areas



¹ <https://www.gailonline.com/ABGailstory.html>

² <https://www.gailonline.com/CSRPolicy.html>

³ <https://www.gailonline.com/CSRHriday.html>



1.2. About the Project

1.2.1. Context

The second wave of COVID-19 **disrupted the medical setup in India and had severe impact on country's healthcare and economic system**. The hospitals suffered acute shortage of medical grade oxygen due to the unprecedented surge in oxygen demand. Many organisations came **forward and supported the medical infrastructure and installation of Oxygen plants** to make the hospital respond to the rising COVID-19 cases. However, **demand-supply gap persisted** as the number of firms who were able to **supply and install Pressure Swing Absorption (PSA) Oxygen plants were limited** in India, as shared by GAIL Nodal Officer.

GAIL (India) Limited supported 12 Government hospitals with installation of PSA Oxygen plants during the period of FY 2021-22. The Ministry of Health and Family Welfare (MoHFW), Govt. of India had received the requisition details from the government health facilities across India with the required capacity of oxygen based on number of beds in their facility and the MoHFW themselves distributed these hospitals across various organisations who were interested in supporting with PSA Oxygen plants. **GAIL was allotted with 12 such government hospitals to supply PSA Oxygen Plants** through engaging two agencies (Molsieve Designs Ltd and Gastek Engg. (P) Ltd.) across 4 states as illustrated below:

Figure 2: Project Specifics

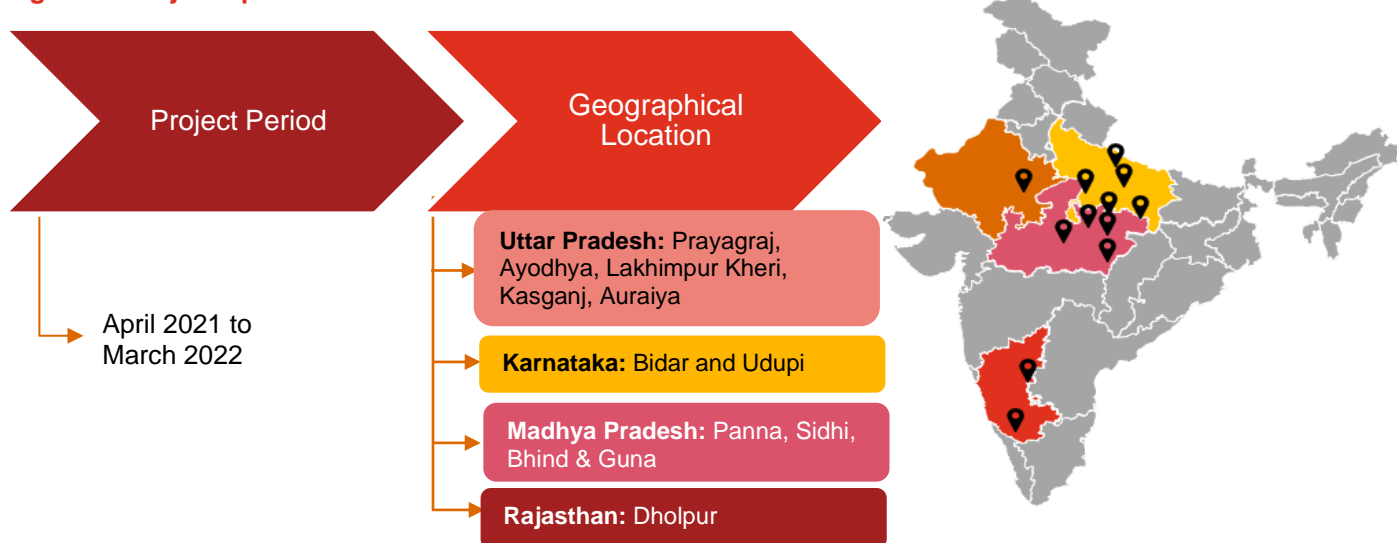
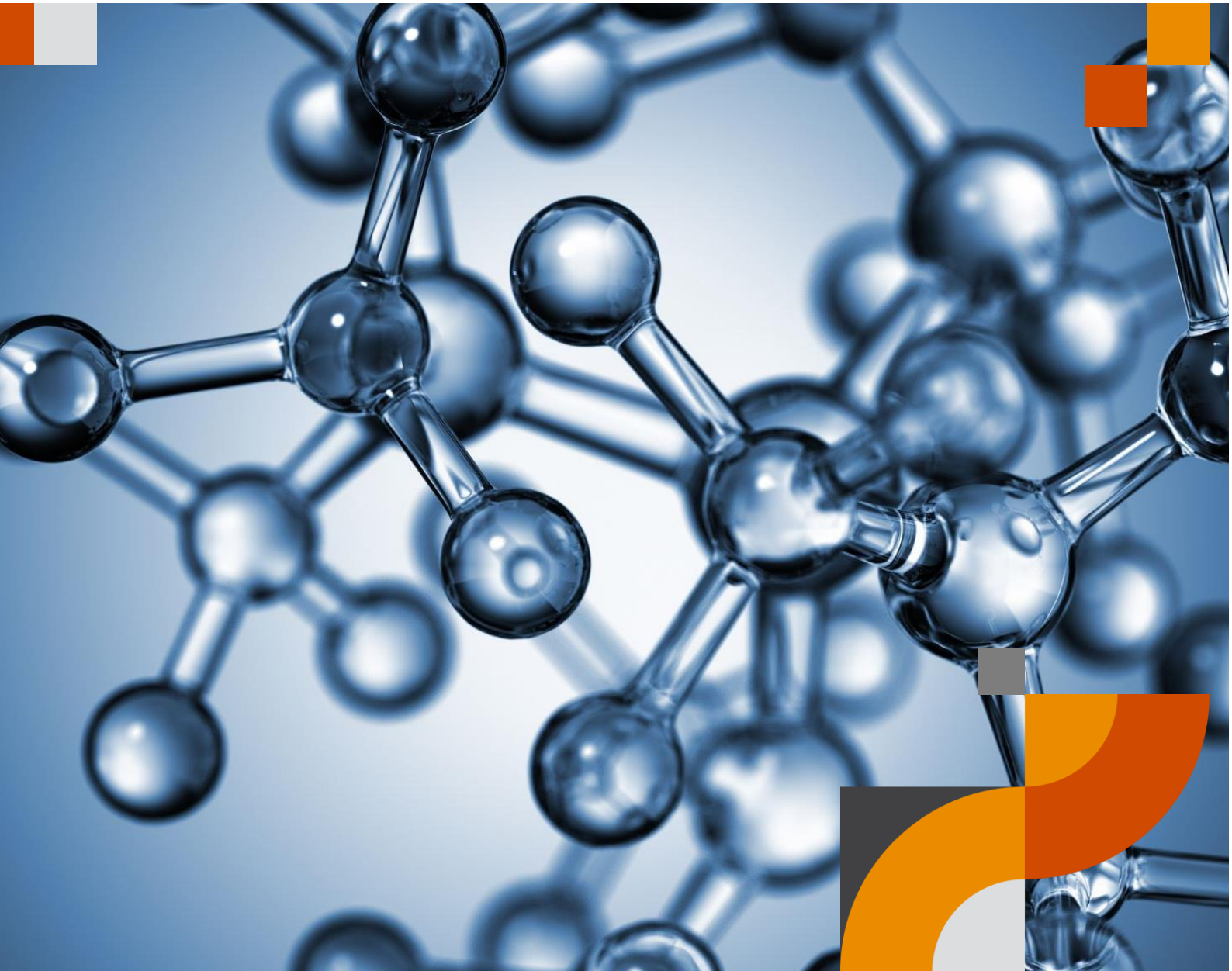


Figure 3: PSA Oxygen Plant at TB Hospital, Prayagraj, Uttar Pradesh





2. Approach and Methodology



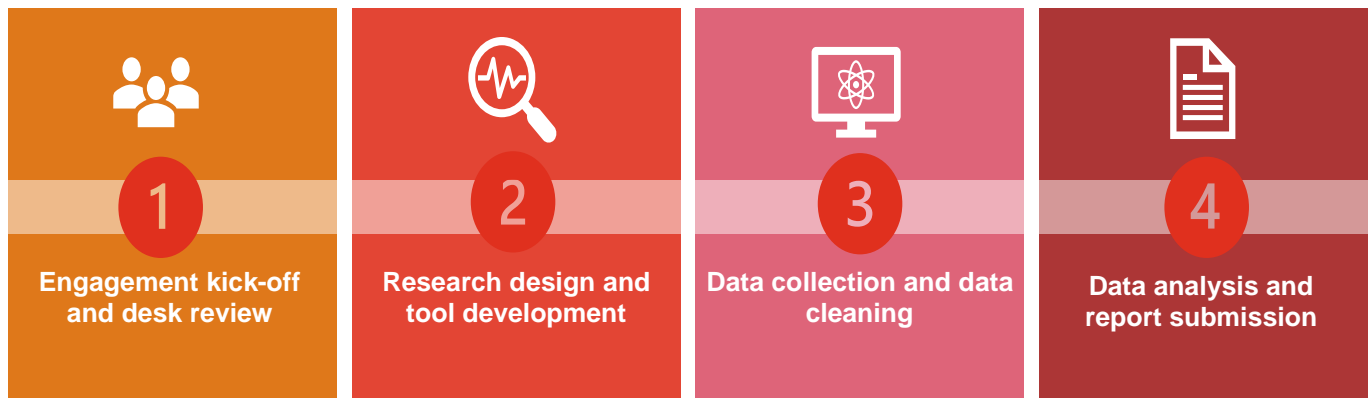
2.1. Purpose and Scope of the Study

GAIL (India) Limited (GAIL) engaged Price Waterhouse Chartered Accountants LLP (PWCALLP) to conduct an impact assessment of its CSR projects. The study aims to assess the overall impact on the community with an objective to bring transparency and provide management with the feedback and recommendations to improve the delivery processes of the CSR projects at GAIL.

2.2. Detailed Methodology

The impact assessment study utilised an integrated and cohesive approach (as depicted in below Figure) which enabled the research team to evaluate the impact of the project on the lives of the beneficiaries:

Figure 4 : Overall approach for assessing the impact of the CSR project



Step 1: Engagement kick-off and desk review

The impact assessment began with a kick-off meeting with the project team from GAIL to discuss the overall scope of work, gain a detailed understanding of the projects and further, align on the expectations of the GAIL from the assessment. Following the meeting, PW team prepared and shared a list of documents required for initiating the impact assessment. Once the documents were received from GAIL, the team initiated the desk review of the documents. Following documents were received from GAIL to initiate the desk review:

- Fax of Acceptance (FOA)- indicating the delivery of PSA Oxygen Plant across different locations (hospital-wise)
- Handing over note – indicating the delivery of list of medical equipment associated with PSA Oxygen Plant (hospital-wise)

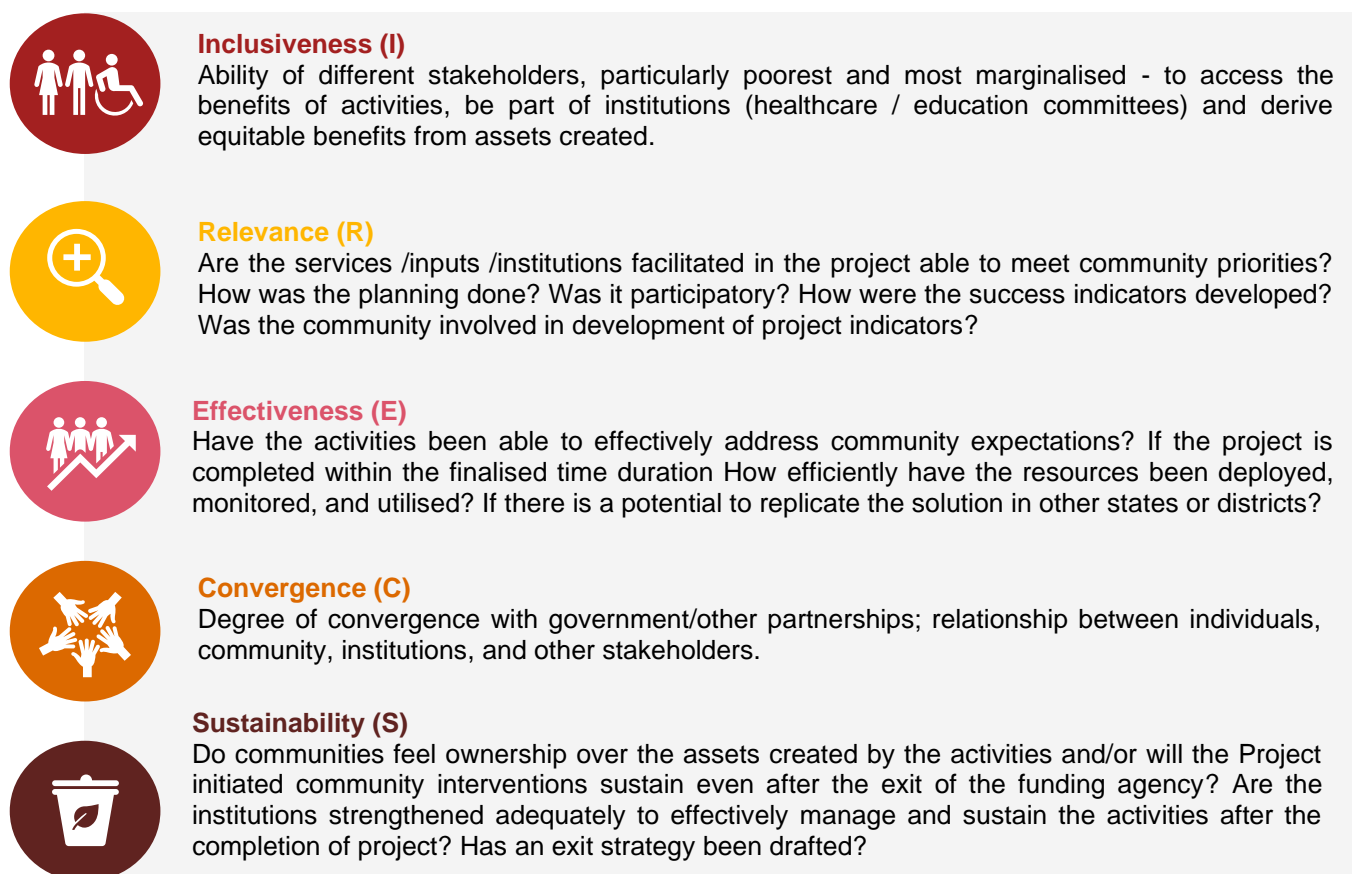
Step 2: Research design and tool development

Team reviewed and understood the monitoring and implementation processes for this CSR project. The impact assessment study was guided by the **IRECS assessment framework** which was used to provide overall feedback on the efficacy of implementation as well, as its efficiency in terms of achievement of the desired project outputs with reference to inputs (refer Figure 5).

Post finalising the assessment framework in consultation with GAIL team, PW team initiated the mapping of the stakeholders of this CSR project for the purpose of impact assessment. Key stakeholders were identified for the project to undertake the qualitative interactions with the related stakeholders.



Figure 5: IRECS Assessment Framework



Basis the review of the projects, each project has been assessed on the above key parameters and further categorised into High/ Medium/ Low basis the impact generated:

Table 1: Description of Categories for Bifurcating Projects based on their Impact Generated

Colour Code	Rating Categories	Description
Green	High	This category highlights that the project has been able to meet the key evaluation parameters of impact within the said IRECS framework.
Yellow	Medium	This category highlights that the project has been able to partially meet the key evaluation parameters of impact within the said IRECS framework.
Red	Low	This category highlights that the project has yet to meet the key evaluation parameters of impact within the said IRECS framework.

After mapping key stakeholder groups in consultation with the GAIL team, the team started developing the research tools for data collection. The assessment for PSA Oxygen plants support project adopted the **qualitative approach**. In this study, PW team covered at least one location from each of the intervention state to ensure the adequate representation of state in the study findings. The details of the locations visited is listed below:



Table 2: Details of the hospitals covered in the study

S. No.	State Name	District Hospital Name	Locations Covered
1	Uttar Pradesh	<input type="checkbox"/> TB Hospital Prayagraj <input type="checkbox"/> Sanyukt Hospital Kumarganj, Ayodhya <input type="checkbox"/> District Hospital, Lakhimpur Kheri <input type="checkbox"/> District Joint Hospital, Kasganj <input type="checkbox"/> District Hospital, Auraiya	<input type="checkbox"/> TB Hospital, Prayagraj <input type="checkbox"/> District Hospital, Auraiya
2	Karnataka	<input type="checkbox"/> Govt Hospital, Kundapur, Udupi <input type="checkbox"/> Govt Hospital, Basavakalyan, Bidar	<input type="checkbox"/> Govt Hospital, Kundapur, Udupi
3	Madhya Pradesh	<input type="checkbox"/> District Hospital, Panna <input type="checkbox"/> District Hospital, Sidhi <input type="checkbox"/> District Hospital, Bhind <input type="checkbox"/> District Hospital, Guna	<input type="checkbox"/> District Hospital, Guna
4	Rajasthan	<input type="checkbox"/> Sub-divisional Hospital, Bari, Dholpur	<input type="checkbox"/> Sub-divisional Hospital, Bari, Dholpur

The below table indicates the stakeholders mapped for the qualitative interactions for this CSR project:

Table 3: Mapping of qualitative interactions for GAIL PSA Oxygen plants support project

Mode of Qualitative Research	Stakeholders Covered under Qualitative interactions under the project	Type of Activity	
Face-to-face interactions	<input type="checkbox"/> GAIL Nodal Officer	(1)	In-depth interviews (IDIs)
	<input type="checkbox"/> Chief Medical Officer / Facility Administration (from each of the hospital visited)	(5)	
	<input type="checkbox"/> Doctors	(4)	
	<input type="checkbox"/> Nurses	(5)	

The team conducted qualitative interviews with facility administration / CMOs and the doctors / Nurses to understand the challenges as well as benefits of the PSA Oxygen plant. The purpose was to understand the impact created by the intervention and the roadmap going forward.

Step 3: Data collection & data cleaning

PW team also ensured sensitising GAIL project team on the requirements from impact assessment study. Post finalisation of the data collection plan, the research team from PW was oriented on the research tools (qualitative) and dos and don'ts during data collection. Once the qualitative data was collected, data entry and cleaning were carried out.

Step 4: Data analysis & report submission

After the data entry and data cleaning, the analysis was carried out to arrive at the insightful and overarching findings for this project. The draft report was prepared accordingly and shared with GAIL for review and inputs. PW submitted the final report to GAIL for management's consideration post incorporating the inputs received from the team.





3. Programmatic Finding



3.1. Summary of the Impact by the Project

Based on the field interactions with hospital administration, doctors/nurses, and GAIL project team following challenges were identified:

Pre-project situation:

- During the pandemic, many hospitals realised the need of a continuous oxygen supply and noted the challenges of depending upon oxygen cylinders and concentrators solely. MoHFW helped such hospitals to by facilitating the CSR funding support from potential corporates. GAIL supported 12 hospitals with installation of PSA Oxygen plants with the capacity to generate:
 - 415 litres per minute (LPM) capacity in seven hospitals
 - 833 LPM capacity in three hospitals
 - 830 LPM capacity in one hospital
 - 1000 LPM in one hospital
- Project team from GAIL specified that almost all the patients in the government hospitals generally belonged to lower socio-economic strata of the society who were not able to afford treatments in a private hospital. Further, **these hospitals were consequently (& overwhelmingly) burdened with larger footfall from nearby villages during the COVID-19 pandemic.** Hence, it becomes imperative for the hospital to be well equipped to cater the needs of patients.
- Based on the interactions with the representatives from the government hospitals, it was collectively reported that the **healthcare staff was entirely dependent on the limited number** of B-Type portable cylinders (10 Litres capacity), D-Type cylinders (46.7 Litres capacity) and Oxygen Concentrators with the average flow rate of 3 LPM.
- Doctor in these facilities further added **the issues associated with this medical equipment, wherein an oxygen concentrator had challenge of overheat due to continuous usage of more than 3 days** whereas B and D type cylinders were having the **weight issue.**
- Transportation of **these cylinders from one ward to another was also problematic and required at least two personnels for shifting and installing the cylinders.** Doctors from the Dholpur and Guna hospitals shared that the time consumed in placing a cylinder had been very critical as it would result in a life and death situation.

Figure 6: B and D Type Oxygen Cylinders in Prayagraj TB Hospital



Figure 7: Oxygen Concentrator available in the Prayagraj TB Hospital



Disaster response and emergency preparedness:

- As per the GAIL project team, the turnaround time in installation of PSA Oxygen plants in the government facility was **around 3 to 4 months (on an average)**, proving the intervention to be effective in nature as the plants were able to cater COVID-19 patients as well.



- Medical officer from Guna district hospital also added that before the intervention, they **used to rely on refillable cylinders and the consumption rate was up to 60 cylinders in a day** based on an average occupancy in IPD and newborn unit as well. However, consumption level increased from 60 to 100 cylinders per day during COVID-19 phase I and II, which eventually affected the operating costs, manpower usage and challenged the infrastructure capability to adhere and withhold rising patient's intake. TB Hospital in Prayagraj shared that **due to limited availability of oxygen they used to refer all critical cases** requiring immediate and continuous oxygen support as per doctors' preliminary diagnosis. However, with the **deployment of oxygen plant**, they felt confident enough to accept almost all cases that come under their way. As a result, the TB hospital in Prayagraj district has now been able to cutdown the referral rate to one-third as compared to the situation before project intervention, as reported by CMO, Prayagraj.



Patients in TB hospital requires continuous oxygen support. We have a capacity of 170 beds; Although, the cylinders were in adequate quantity but there is a logistical issue (refilling, transport, installation) as well as operational costs associated with it. As a result, the referral rate of this facility was high, as the management didn't want to risk patients' life due to above limitations. However, post intervention, we have a direct supply of high purity medical oxygen to each of the bed in our facility. Even the nursing staff are now confident enough to cater any critical cases till the doctor arrives for diagnosis.

- **Medical Officer, TB Hospital Prayagraj**

- Post installation, representatives from all the hospitals covered during the study in consensus reported their preparedness towards any such pandemic in the future. Doctors in Dholpur district, shared that the hospital now **can cater to a larger population of patients and can also provide facility of oxygen support to other institutes as required**. Further, the TB hospital Prayagraj stated that now there has been no such cases of mortality reported due to the shortage of oxygen in their facility.

Figure 8: Head panels connected directly with PSA Plant in Prayagraj TB Hospital



Access to quality treatment at no cost:

- Facility administration from the hospitals reported that the installed oxygen plant is of reputed brand and **high-quality and was an important addition to their respective hospitals which strengthen their efforts in providing access to quality healthcare facility to patients**.
- The **patients were able to access good quality and free of cost treatment** which was difficult to obtain especially for **low- and middle-income group** people during the COVID-19 pandemic. The project was able to provide **cost intensive support of oxygen supply** to all sections of society which **otherwise** would have **costed them between INR 1000/- to 2000/- (average) on a per day basis** (as reported by multiple doctors across different health facilities) **outside for continuous and prolonged oxygen supply**.
- The Medical Officer (MO) from Prayagraj shared that on **an average government has been spending a minimum of around INR 75,000/-** per patient including meals, services, and other operational costs (oxygen cylinder support) in the last few years. However, due to the support of oxygen plant the per patient expenses has been reduced significantly.



Strengthening healthcare infrastructure:

- COVID-19 pandemic provided an opportunity to strengthen the public health system and its delivery mechanisms. The **installation of PSA oxygen plants in the government facilities has strengthened the medical infrastructure.** These plants were commissioned on the onset of surge in demand of oxygen during COVID-19 and at many places, the plant became operational when the second COVID-19 wave was subsided. However, the Kundapura hospital (170 bedded hospital) in Udupi district was declared as the designated COVID-19 nodal centre for the region and was accommodating patients in full capacity during second and third wave as reported by Administrative Surgeon. The concerned staff further added that the **entire facility has been dependent solely on the PSA oxygen plant from the date of installation** and have oxygen cylinders stored as backup. The hospital administrators added that they are now better equipped to manage critical cases. The oxygen plant has been a valuable addition for TB hospitals which require constant demand of oxygen supply. **The Medical officer from this facility shared that for patients with Tuberculosis, Hemoptysis, Pulmonary Edema and Empyema, require continuous supply of high purity oxygen, that contributes to be a major factor in improving the survival rate of a patient and which has been addressed through this intervention.**

Figure 9: PSA Oxygen plant in Udupi district



Maintenance of the PSA Oxygen Plants:

Figure 10: PSA Oxygen Plant of Guna district hospital



- GAIL engaged two vendors Gastek Engg (4 locations) and Molsieve Designs (8 locations) for installation of 12 PSA Oxygen plants across four states. The **standard warranty period between the government hospitals and vendors was for a period of 2 years followed by 1 year of Annual Maintenance Contract (AMC).** During these 3 years (from the date of installation), the vendors were responsible for any service-related issues raised by these hospitals which included repair and replacement of parts with service charges as well.
- GAIL project team further added that as per the mutual agreement, plants have now been handed over to the health facility. However, the **hospital administration across location in consensus shared the need of an annual maintenance contract (AMC) to be drawn for them as these plants are highly technical and requires only trained specialists** for any major inconsistencies observed. GAIL project team added that **the suppliers (Molsieve and Gastek) has trained the local staff on operations of PSA Oxygen Plant at the time of handing over.** This strengthened capacity of staff with an aim to create holistic impact through utilisation of newly created system of oxygen supply in the hospitals.
- In reference to the costs associated with maintenance of the Oxygen Plant, Medical Officer from Udupi shared that each such servicing of Oxygen plant machinery involves enormous costs and ultimately, it's the taxpayer money therefore the hospital administration would want to utilise the same judiciously. Further, the **CMO Prayagraj shared that there should be a designated staff assigned for administration of these facilities.** As currently, the local staff technician with their limited knowledge is handling the operations of the plant.

Doctors in Guna district hospital shared the recent incident where the plant was not operational for a period of 15 days as it was beyond the warranty period. They insisted that if an AMC would be in place than such situations can be avoided.

Positive impact on the community

- The intervention has created a positive image of the government hospitals and their services among the patients, who would have to sustain the discomfort associated with the manual installation of cylinders earlier. With the proper maintenance the plants **can certainly help in case of emergency and can supply free of cost oxygen to other nearby health facilities (Primary health centres or sub centres)** whenever needed.
- **The PSA Oxygen plant is considered to be a ‘clean technology’ as the raw material it uses to generate medical grade oxygen is the ambient air making it environment friendly.** Moreover, they are reliable on-demand production units and there is no high-risk handling of hazardous high-pressure cylinders involved. This eliminates the potential delivery and transport safety issues.

3.2. IRECS Analysis

Basis the interactions with the key stakeholders and desk review of the documents, the impact of the project was evaluated on the “IRECS framework.” The IRECS analysis summary has been presented in below table:

Table 4: IRECS Analysis of Project

Parameter	Rating Category	Assessment from study
Inclusiveness	High	<ul style="list-style-type: none"> ❑ The project provided access to quality treatment to all the patients requiring oxygen support during the project period irrespective of their socio-economic status. ❑ Further, as informed by the hospital administration and medical officers’ majority of the patients belonged to lower socio-economic strata. The project helped people from falling in financial distress for medical treatment. Thus, the project is inclusive.
Relevance	High	<ul style="list-style-type: none"> ❑ Government of India supported many health facilities by setting up of Oxygen plants to cope with the rising COVID-19 cases. Realizing the need, central government requested support from corporates under CSR initiatives in order to reach maximum number of hospitals. GAIL was approached by the government and the commitment of supporting 12 such health facilities was undertaken. With this intervention, the supply of oxygen for the patients increased. ❑ The support by GAIL was appropriately timed, the intervention undertaken was relevant during those times when availability of medical oxygen across the nation was scarce, the demand had spiked, and number of people lost their lives due to shortage of oxygen. ❑ Hospitals now have shifted from the manual and tedious process of handling the oxygen cylinders to hassle free piped transportation and continuous supply of oxygen.
Effectiveness	High	<ul style="list-style-type: none"> ❑ As informed by the doctors, nurses, and hospital administration in the TB hospital, before the project support, due to non-availability of continuous and uninterrupted supply of oxygen, severe cases were directly referred to other hospitals, hence increasing the referral rate of the facility. However, post intervention the hospital has now been able to reduce two-third of their referral rate due to the PSA Oxygen plant. ❑ The project intervention impacted the health of the patients and ensured no mortality due to shortage of oxygen supply thus proving it to be effective.



Parameter	Rating Category	Assessment from study
		<ul style="list-style-type: none"> ❑ Earlier, the hospitals were able to cater only limited beds and those with severe conditions were prioritised. However, now the oxygen supply is available for all the beds in the hospital.
Convergence	High	<ul style="list-style-type: none"> ❑ The purpose of this intervention was to augment the capacity of the current health care system with the overarching idea of creating an ecosystem which is future ready to cater to any such requirement. ❑ The project was implemented by GAIL to strengthen the efforts of Government of India during the COVID-19 pandemic. GAIL tied up with different Government hospitals to ensure the uninterrupted supply of Oxygen during the crisis.
Sustainability	Medium	<ul style="list-style-type: none"> ❑ The plants have been installed and training has also been provided to the staff on operations. With proper maintenance the plant shall be able to serve for prolonged period and thereby building in-house capacity for regular upkeep of the plant which was not prevalent under this project. ❑ The oxygen support is being utilised to cater to the requirements of all those admitted in IPD, and ICU till date. Hence, making the intervention sustainable for future. ❑ The support has enabled the hospital to serve larger pool of patients and impacted the reduction of referrals made from the hospital. All the equipment were reported to be of best quality and are currently functional and can be used for longer period. ❑ It is suggested that annual maintenance contract (AMC) should also be drawn well in advance beyond 3 years as due to some technicality failure or service-related issue the plants may not work and that can impact the patients and also shall affect the credibility of the government hospitals.

3.3. Alignments to GAIL's CSR Policy and UN SDGs

The project is aligned with **Sustainable Development Goal: 3 – Ensure healthy lives and promote well-being for all at all ages**, which emphasises on ensuring health life and promoting well-being for all at all the ages, with a specific focus on strengthening healthcare systems. By addressing the pressing healthcare challenges posed by the COVID-19 pandemic through a collaborative partnership with MoHFW, this project has contributed to the overarching goal of good health and well-being.



3.4. Case Stories

Case Story 1

Dr Rajesh Joshi (name changed), **Facility Administrator, Prayagraj (Uttar Pradesh)**, oversees a specialised facility dedicated to treating tuberculosis patients. He mentioned that the hospital faced a critical challenge with the limited supply of oxygen, which was essential for patient care. **Before intervention, the hospital relied solely on 26 B Type and 10 D Type oxygen cylinders, along with 6 concentrators.** This setup posed significant logistical challenges, as the cylinders needed frequent refilling and were cumbersome to transport between wards. Each cylinder required at least two personnel to connect it to a patient's bed, severely limiting the number of patients who could receive continuous oxygen therapy. Consequently, **the hospital could only cater to 10 patients at any given time, leading to a high referral rate** for serious cases to the main district hospital due to the risk of oxygen shortages.

To address these challenges and improve patient care, GAIL supported TB, Hospital Prayagraj with the installation of a Pressure Swing Adsorption (PSA) Oxygen Plant. This strategic decision was driven by the need for a reliable and continuous supply of medical-grade oxygen **for all 140 beds at the hospital.** He added that the hospital can



now accommodate serious cases that require continuous oxygen therapy, eliminating the need for referrals to other facilities due to oxygen shortages. Since the installation of the oxygen plant, **there has not been a single fatality due to lack of oxygen**, highlighting the critical impact of uninterrupted oxygen supply on patient survival rates. **The hospital's referral rate for serious cases has decreased by one-third compared to pre-installation levels.**

He further added that the logistical challenges associated with handling and refilling oxygen cylinders have been eliminated, reducing dependency on external suppliers and improving hospital efficiency. By enhancing its capacity to treat tuberculosis patients locally, **TB Hospital has strengthened its role as a primary healthcare provider in the community, ensuring timely and comprehensive care for all patients.**

Case Story 2

Dr. Rashmi Saluja (name changed), **Administrative Surgeon at Kundapura Hospital in Udupi District**, recalls a time when their facility faced unprecedented challenges as it transitioned into a dedicated COVID hospital. Before the intervention by GAIL, the hospital's reliance on jumbo oxygen cylinders to meet oxygen supply needs posed significant logistical and operational hurdles, particularly during the peaks of the COVID-19 pandemic.

The frequent need for cylinder refills and the labor-intensive nature of managing them strained hospital resources and delayed critical patient care. However, relief came in the form of a revolutionary solution: **the installation of a Pressure Swing Adsorption (PSA) Oxygen plant, boasting an impressive capacity of 500 liters per minute.**

This technological upgrade marked a turning point for Kundapura Hospital, significantly enhancing its ability to provide continuous and reliable oxygen supply to patients, especially during the overwhelming influx of COVID-19 cases witnessed during the first wave. **Dr. Saluja notes that the hospital not only served patients from their own city but also neighboring areas**, where the need for immediate medical assistance was acute.

During this critical period, approximately 70% of patients relied on the PSA Oxygen plant, ensuring consistent oxygen supply across critical sections such as the ICU and general wards. This capability not only bolstered patient care but also eased the burden on medical staff, enabling them to focus on delivering timely and effective treatment.

In contrast to the **unpredictable costs associated with COVID-19 treatment in private hospitals, where expenses can range significantly depending on treatment complexity and duration of oxygen support**, **Kundapura Hospital provided a lifeline without financial strain on patients with the help of PSA Oxygen plant.** This commitment to accessible healthcare underscored the hospital's dedication to serving all members of the community with compassion and equity.

Looking back, Dr. Saluja reflects on the impact of GAIL's support, which transformed Kundapura Hospital's ability to navigate the challenges of the COVID-19 pandemic. **The PSA Oxygen plant stands as a testament to resilience and innovation in healthcare delivery**, ensuring that the hospital remains a beacon of hope and care in Udupi District and beyond.

3.5. Study Limitations

- ❑ As it was an emergency support and directly implemented by GAIL, the contact details of hospital administration were not available with project team. Only such hospitals could be visited whose information (contact person details) were available in the public domain as aligned with GAIL. As it is a disaster management themed project, no baseline data was available.
- ❑ As the project was implemented in FY 2021-22 in government hospitals, many of the stakeholders who are currently in charge of this PSA oxygen plant were posted in some other health facility. Hence, there was some limited information available with respect to initial phase (at the time of deploying PSA Oxygen plants) of the project.





4. Recommendations



4.1. Recommendations

Based on the impact assessment study, the following **way forward and recommendations** are suggested for GAIL's management consideration:

- ❑ **Supporting the larger Ecosystem:** Considering the nature of support, these hospitals are now equipped with sustainable source of oxygen supply. Hence, such hospitals can further tie-up with nearby Primary Health Centre (PHC) and Community Health Centre (CHC) for providing continuous and uninterrupted supply of additional oxygen cylinders and eliminating the reliability on private counterparts.
- ❑ **Provisioning of Annual Maintenance Contract:** Hospital administration appreciated the services provided by GAIL and vendors during the warranty period. However, it is suggested that AMC should also be drawn well in advance beyond 3 years as due to some technicality failure or service-related issue the plants may not work and that can impact the patients as well as credibility of the government hospitals. This can be done by drafting contractual arrangements in advance between vendors and government hospitals so that hospitals can reach out to these vendors independently and take support for necessary repair and maintenance.





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