



PSA Oxygen Generation Plant **Operation and Maintenance**

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Government of India

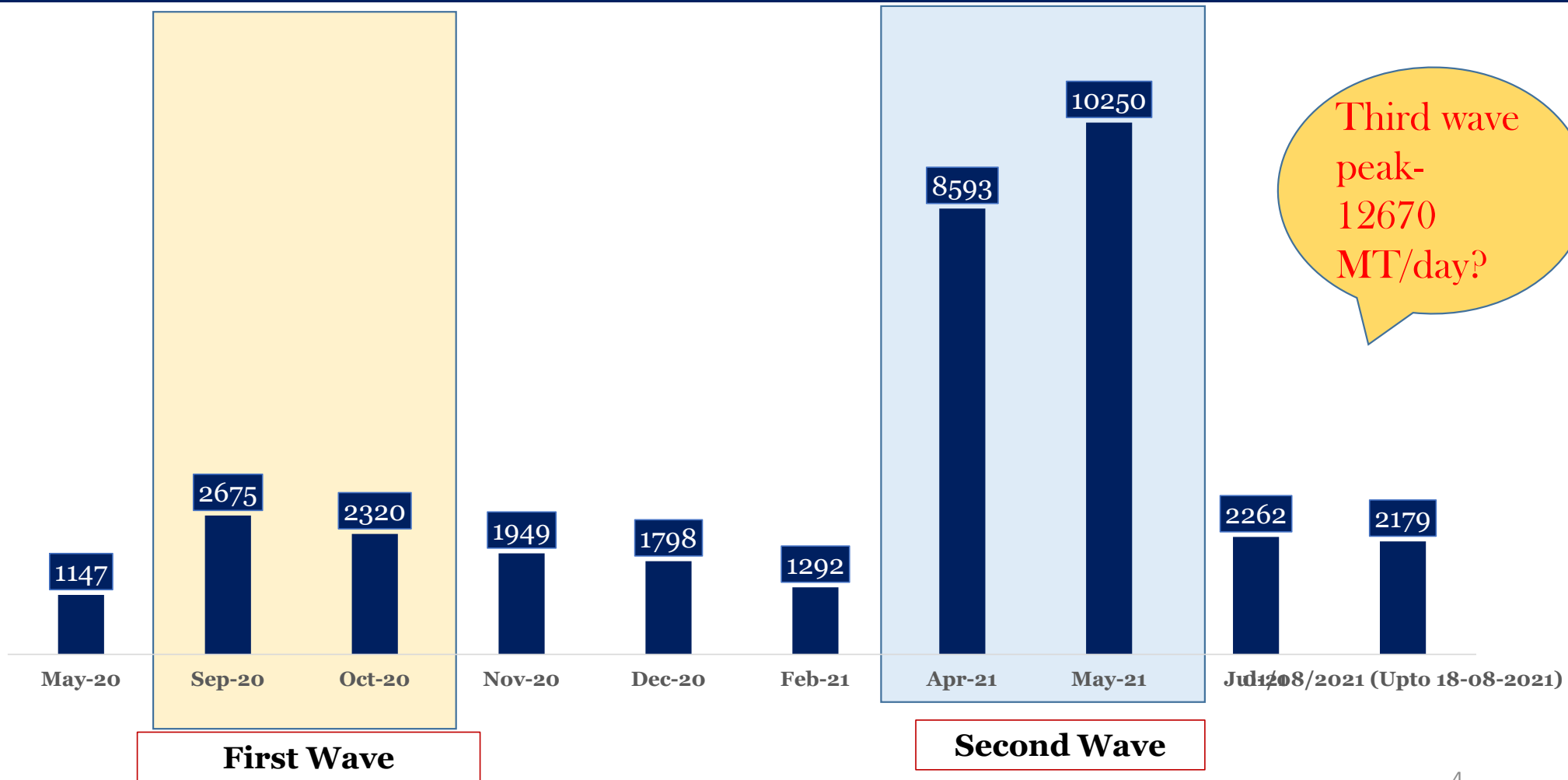
Background

- Second wave of Covid-19 in April- May 2021: high demand and acute shortage of medical oxygen.
- Medical O₂ as the single most important intervention for severe and moderate cases.
- Lessons learnt the hard way: Empowered group for O₂ management
- Absence of a proper Supply chain Management- Lack of availability, production capacity and logistic issues.
- Based on various projections : 4 to 6 lakh cases per day and a peak active case load of 55 lakh- 20% moderate to severe cases requiring Medical Oxygen
- Oxygen management Plan: infrastructure to meet O₂ demand in case of surge
- ODAS (Oxygen Demand Aggregation system) and ODTS (Oxygen Digital Tracking System)
- Pressure Swing Adsorption (PSA) plants in all hospitals as one of the strategy.



Medical Oxygen: PSA Plants

Average Monthly Liquid Medical Oxygen Supply (MT/day)



Medical Oxygen Augmentation Sources

Government of India worked towards Medical Oxygen Enhancement through below mentioned Oxygen sources :

- **Pressure Swing Adsorption Plants – 3503** (out of which 1222 PM CARES , 291 Other Ministries , 57 Foreign Aid , States initiatives – 1933)
- **Liquid Medical Oxygen - 18886 Metric Tonnes**(as on August 31,2021)
- **Oxygen Cylinders – 402517 Nos.**
- **Oxygen Concentrators - 1,43,397 Nos.** (out of which 100000 PM CARES ,14000 ERCP , 29397 Foreign Aid)

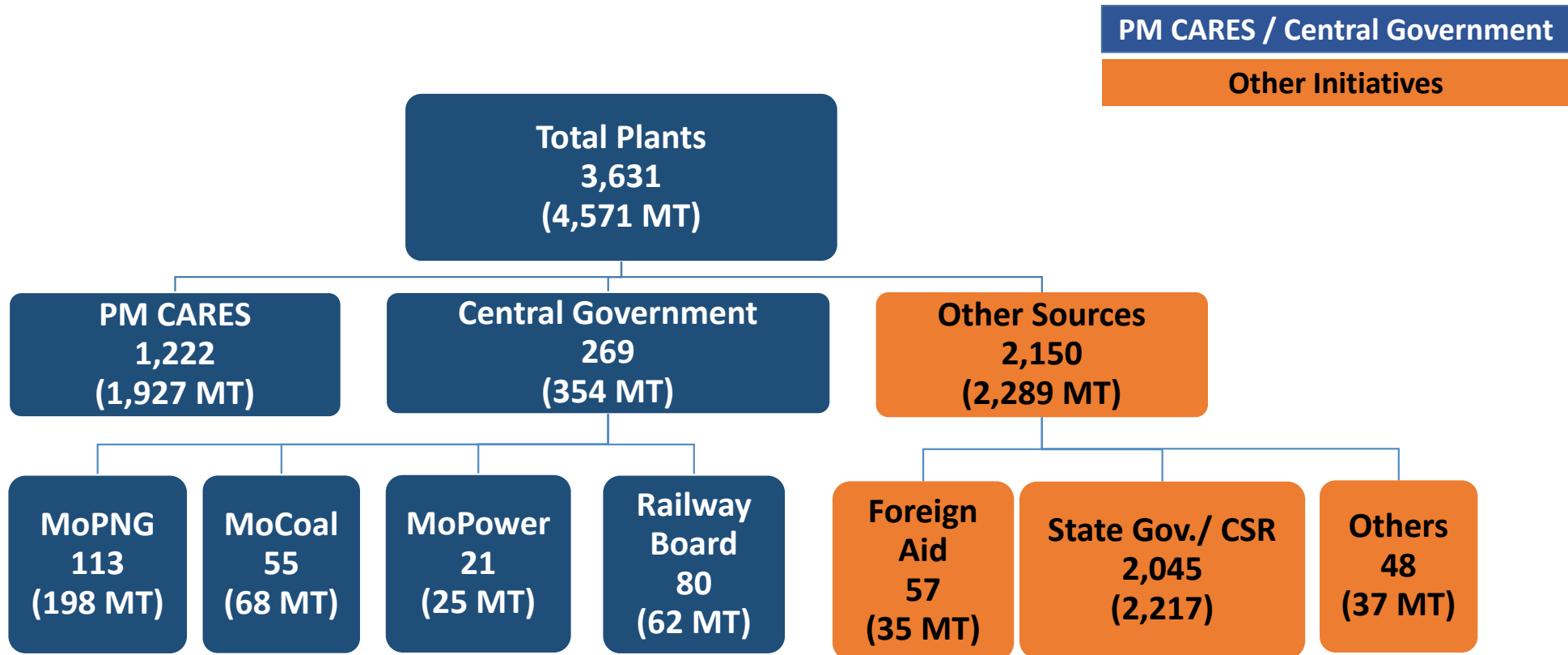
Pressure Swing Adsorption Plant

Need of the Oxygen :

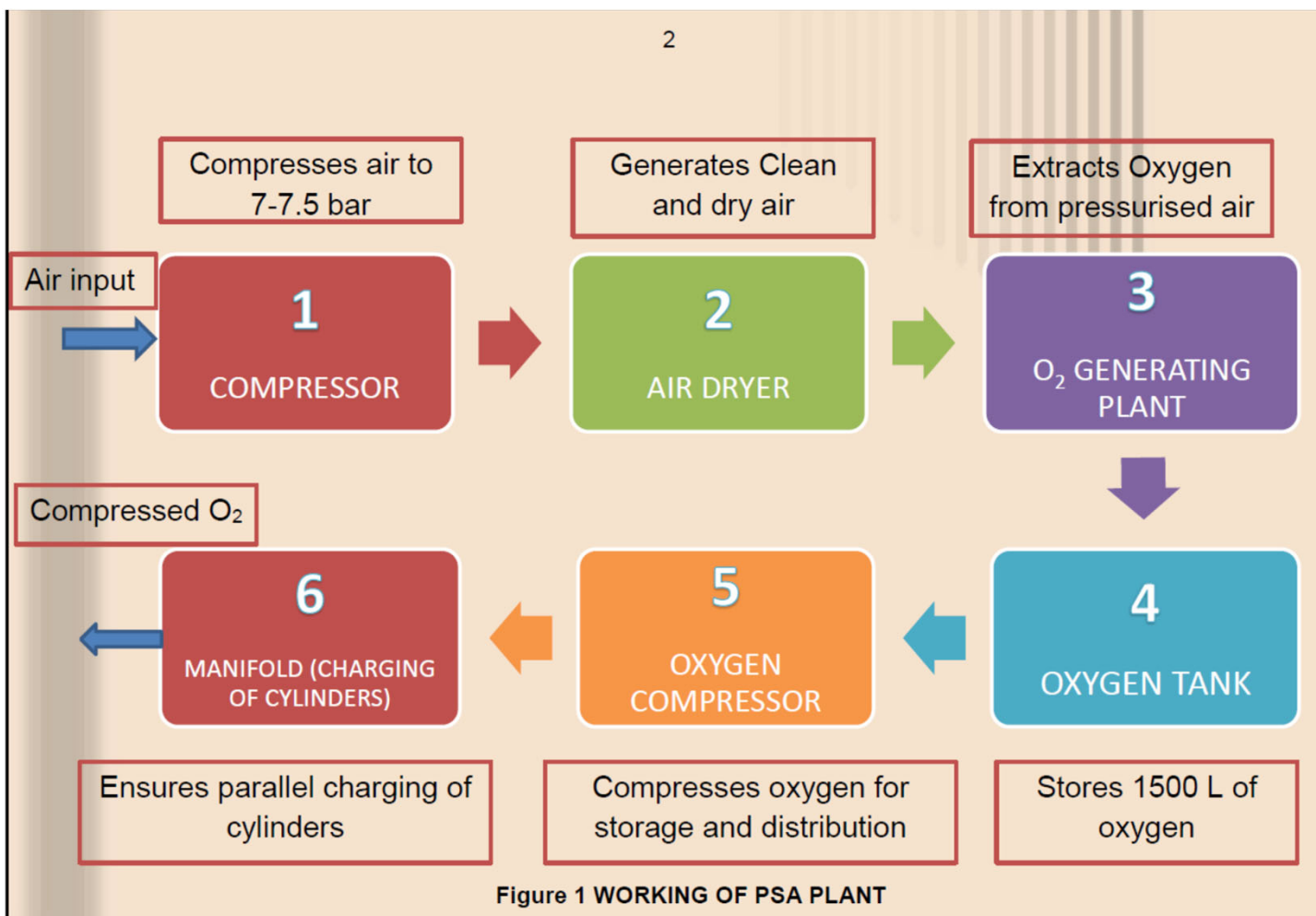
- When SpO₂ falls below 89%
- Supplemental oxygen is needed For patients Suffering from COPD , Sleep apnea , Hypoxemia
- Oxygen is an essential medicine required at all levels of the health care system; only high quality, medical-grade oxygen should be given to patients.
- Pressure swing adsorption (PSA) oxygen generating plants are a source of medical-grade oxygen.
- PSA plant is a technology used to separate some gases from a mixture of gases under pressure according to the molecular characteristics & affinity for an adsorbent material like Zeolite ,used as trap. The process then swings to low pressure to desorb the adsorbed material.
- PSA plant is used when purity requirement is 90-96% V/V, remainder should consist mostly N₂ and must monitor O₂ concentration with $\pm 1\%$ accuracy ,with a prefilter (5 μ m) and coalescing filter (0.1 μ m)

PSA Plants

(As on 21th Sept 2021)

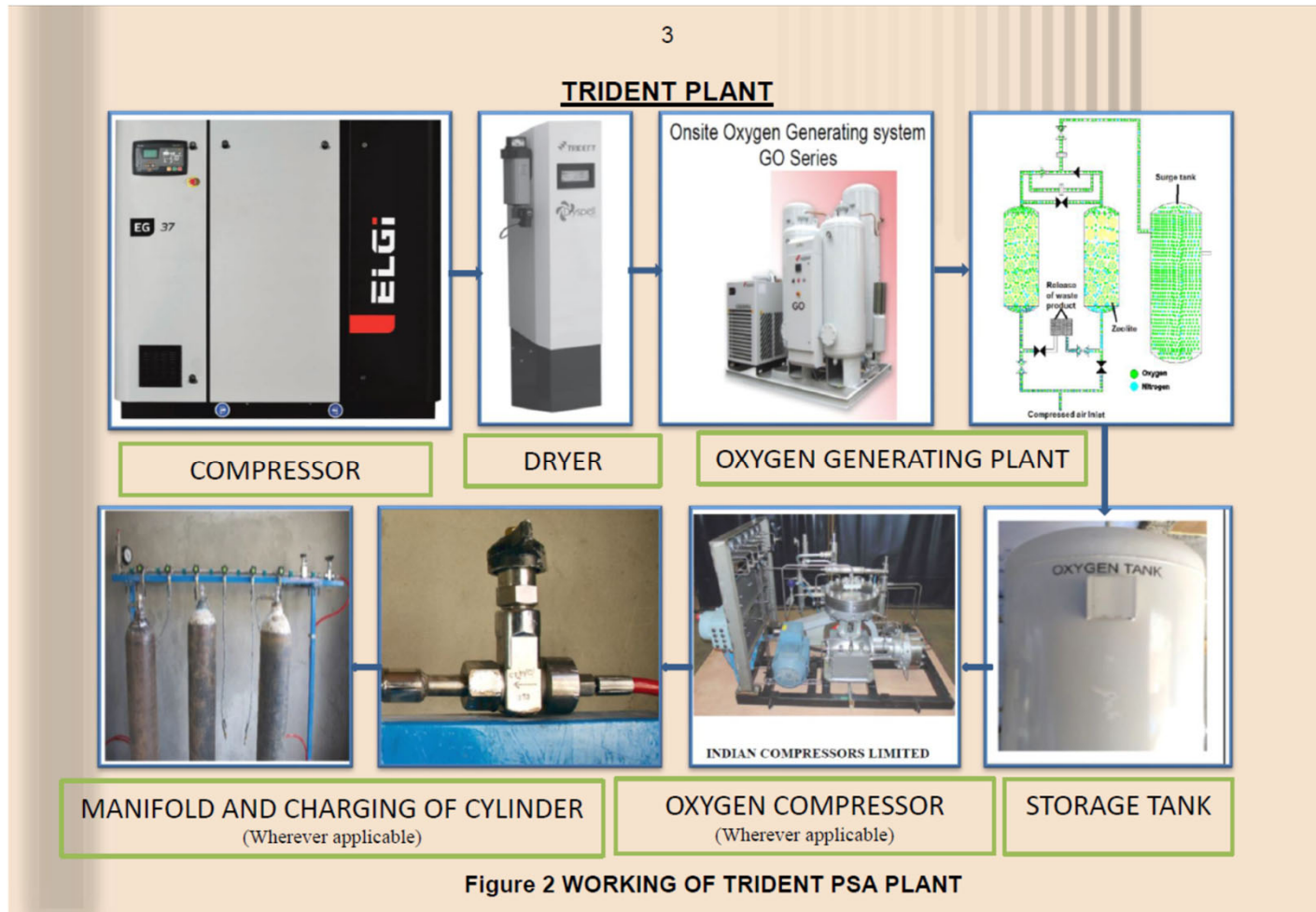


Pressure Swing Adsorption Plant – components



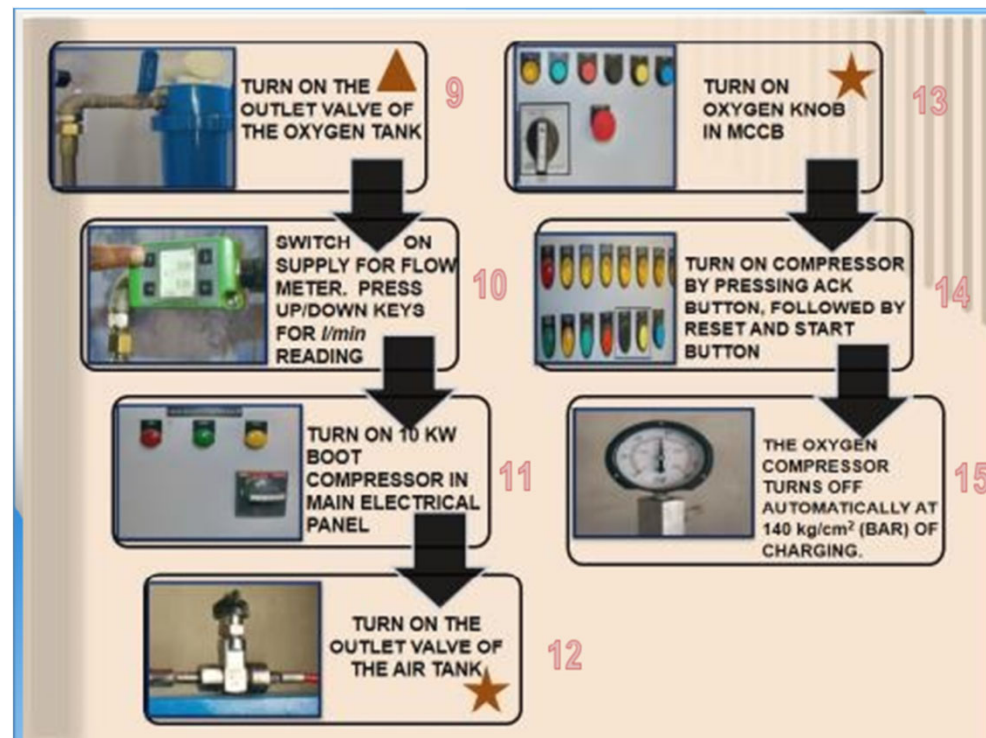
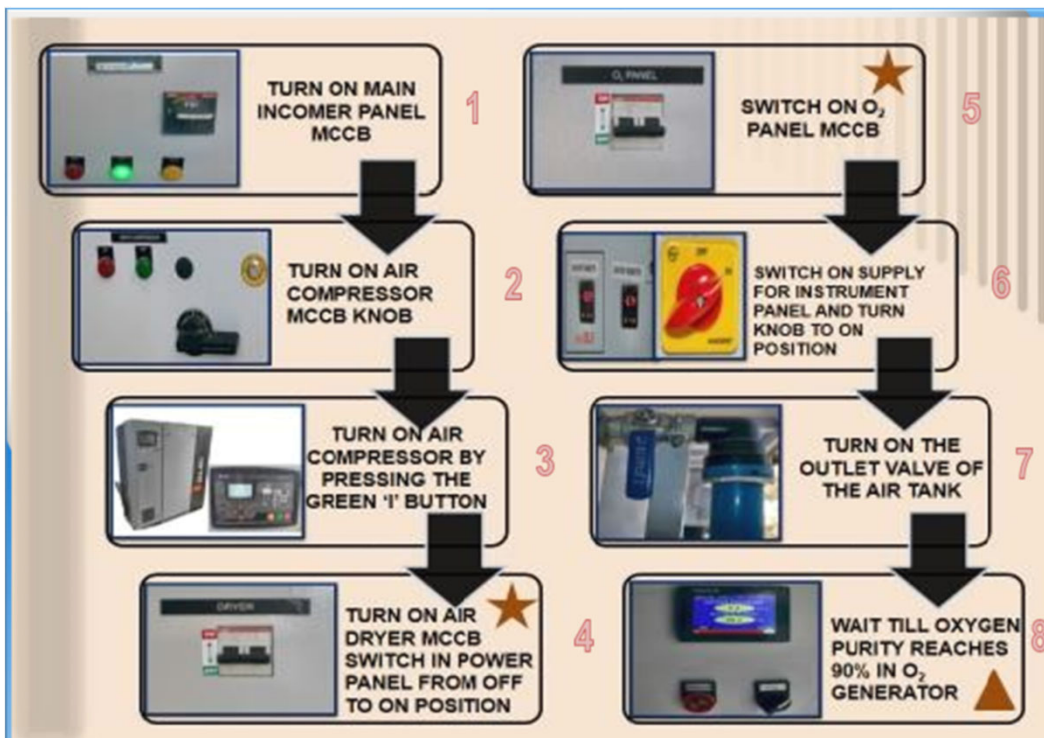
Pressure Swing Adsorption Plant – components

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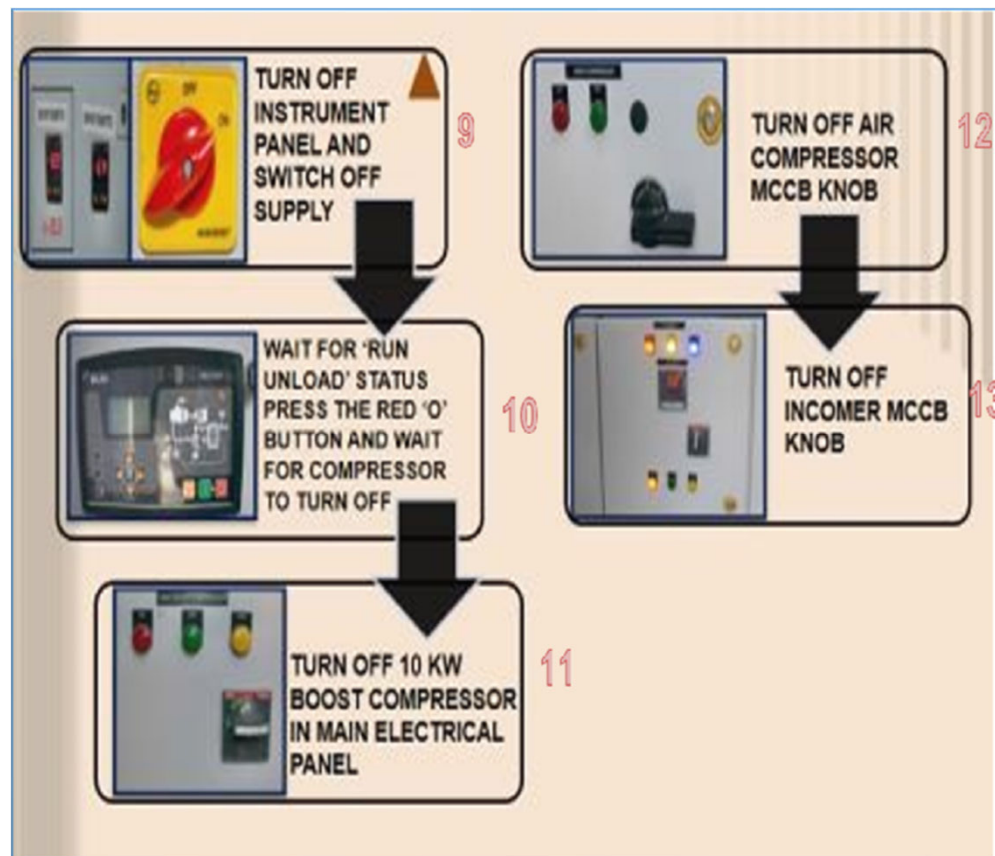
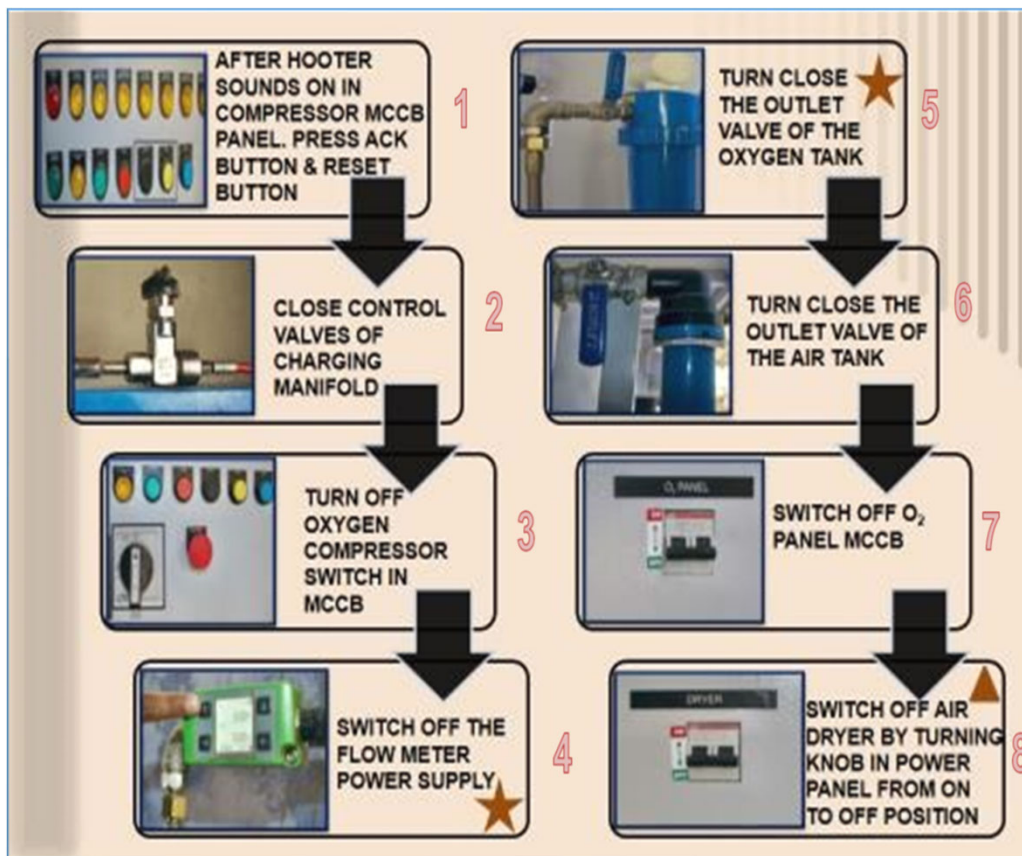
Pressure Swing Adsorption Plant – Operation

PLANT START-UP



Pressure Swing Adsorption Plant – Operation

PLANT SHUTDOWN

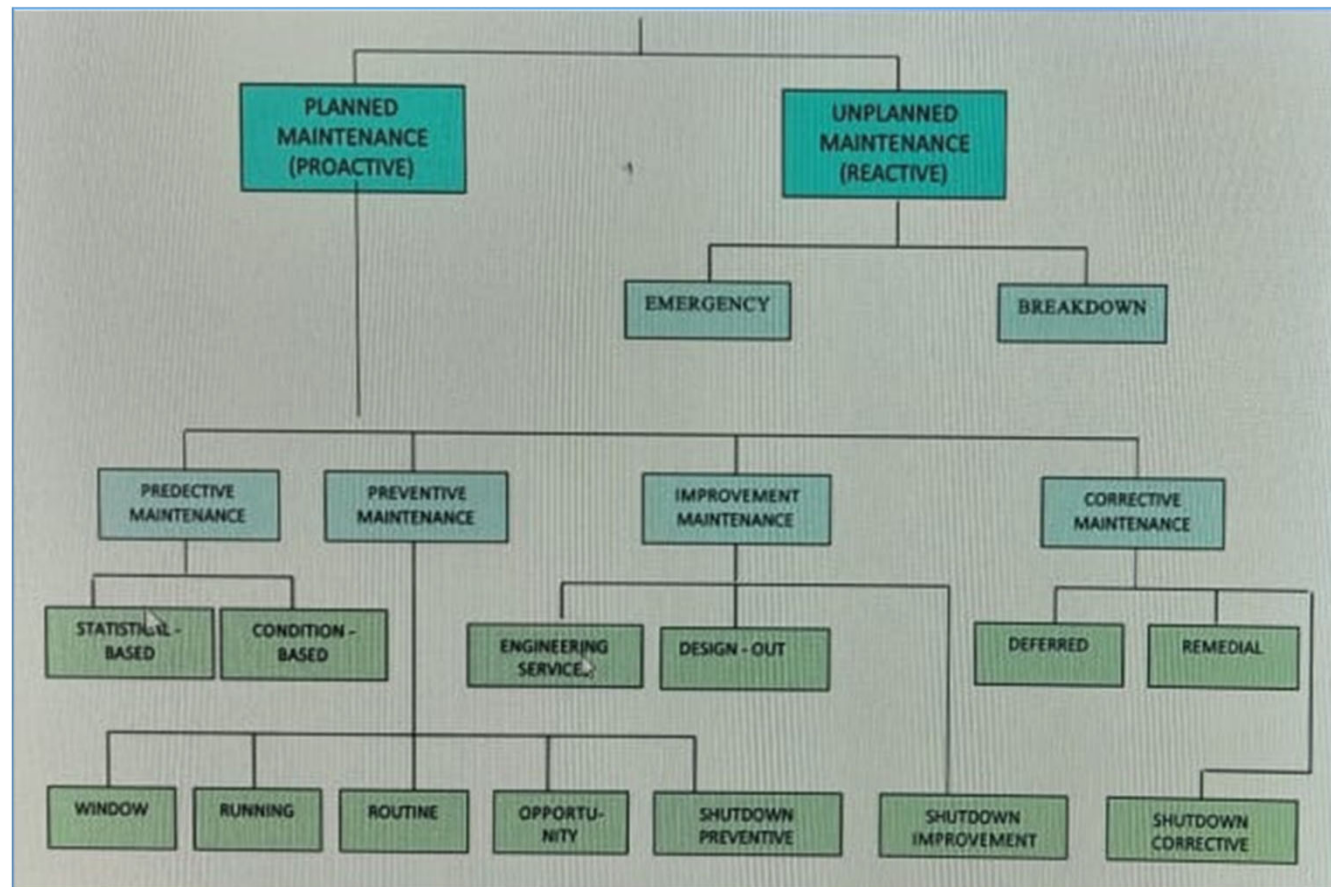


Pressure Swing Adsorption Plant – Need for Maintenance

- Set of organized activities to keep PSA plant in best operational conditional with minimum cost
- All moving components wear down –Need to restore before performance reduction
- Consumables viz Filters – Cleaning /Replacement
- Safety and reliable order
- Avoid/ Reduction unexpected Breakdowns & downtime-Preventions is better than cure
- Repairs due to Incorrect operation
- Save Power , Efficient Operation

Pressure Swing Adsorption Plant – Maintenance

MAINTENANCE TYPES



Status of Training- as on 21st Sept 2021

- Objective: train 8000 technical persons across the country for the operation and maintenance of PSA plants.
- Training module was prepared jointly by IIT Kanpur and Naval Dockyard Vishakhapatnam, covering the components of PSA plants ,its working Principles ,Operation & Maintenance, Technicalities etc.
- The online training program is undertaken by Directorate General of Training (DGT) through 24 regional centers across the country
- In the first Phase, a batch 85 candidates trained as Master Trainers through a 05 day session.
- Two modules of training- one for Technically qualified persons (ITI pass outs) 180 hrs intensive training on PSA plant operation and maintenance. 2215 candidates completed training and around 5000 are under training
- Special Training Session for candidates nominated by states @ 2 per PSA plant- 1529 candidates trained
- List of Candidates Trained by DGT has been uploaded on PM CARES portal.



THANK YOU