

# ISAP2019

(Thematic Track 15)

## Approaches for Transferring Low-carbon Technologies in Developing Asia

- From the viewpoint of transferring  
air compressor system -

IGES Fellow SAITO Tsukasa



**ISAP2019**  
持続可能なアジア太平洋に関する国際フォーラム  
International Forum for Sustainable Asia and the Pacific

# 1 Introduction

## 1. Rationale for Activities

To promote transferring low carbon technologies, its efficient operation methods, and know-how on energy saving to developing economies in Asia (especially India), as a mechanism for reducing CO<sub>2</sub> emission and environmental load. Reducing CO<sub>2</sub> emissions is shared concern across many countries and not just limited to India.

## 2. Why compressed air system?

The compressed air system is one of the most commonly installed utility in the industrial facilities. It is the only utility that is produced in the premises of an industry, unlike water, electricity, and fuels.

With improved operational practices and technical know-how, the compressed air system has a high potential for reducing energy consumption. This benefits the cost of the utilities and leads to overall improvement in operations and maintenance.

## 3. Some of the effective measures for promoting technology transfer

Comprehensive and precise knowledge on payback period, long-term benefits, environmental impacts, etc.

On the ground activities:

- Investigation and recommendations for improving efficiency through feasibility studies (FS)
- Training energy auditors and managers (and distributors) on better operating practices
- Introducing efficient technologies to the industry representatives through awareness workshops



2

# Overseas Missions and Major Activities



Vietnam



Thailand



Feasibility Study In INDIA

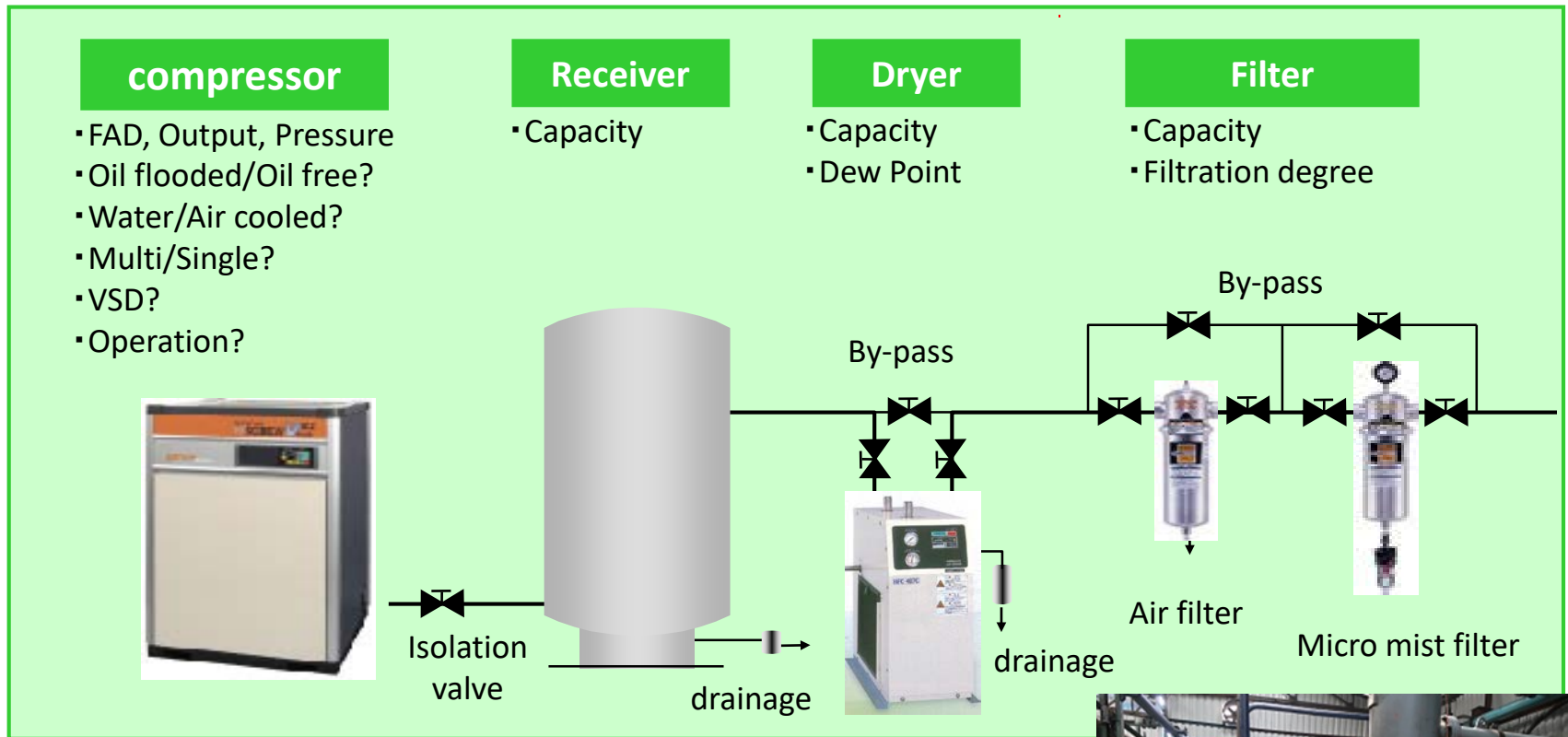


Workshop In INDIA



Training of Trainers In INDIA

### 3 Standard Compressed Air System - Re-examining the air supply system



Activities for CO2 emission reduction and waste elimination in a compressed air system

- Effective use of inverter machine
- Introduction of unit control system
- Reduction of leakage
- Efficient operation technology
- Piping technology
- Effective use of air

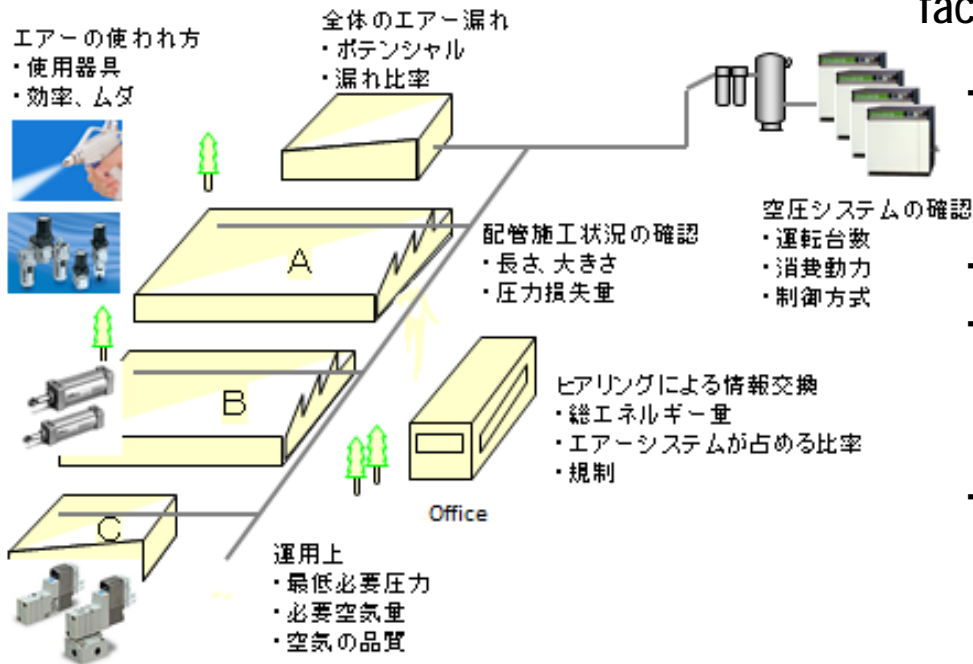


## 4 Scope of Feasibility Study (FS)

--- Identifying Potential for CO2 Emission Reduction

Activities for CO2 emission reduction ... raising awareness and motivation for Global environmental protection ... promote shared understanding

Recommendations for reducing the industrial facility's environmental impact



### - Reduction of industrial wastes

... Maintenance cycle, amount of lubricating oil, maintenance parts

### - Drain treatment ... Detoxifying

### - Vibration and noise reduction

... Considerations to ecosystem and environment

### - 5R activities (realizing the recycling-base society)

... Recycle, Reuse, Reduce, Refine, and Reconvert to Energy

Advanced innovation through IoT, FEMS, and monitoring technology

## 5 Common Measures for Improvement

The typical examples of measures for improvement and expected CO2 emission reduction effects are summarized at the table below.

Based on field observations, these measures address some of the commonly observed problems across compressed air systems. After implementation, it is recommended to verify the effects of the suggested measures.

### Major measures for improvement and expected CO2 emission reduction effects

Measures for improvement	Expected CO2 emission reduction effects
1. Lowering pressure	About 8% reduction when lowering pressure by 0.1MPa
2. Changing control of compressor	About 20% reduction by changing/recombining compressor operation
3. Improving pressure loss in piping	About 5% reduction in total
4. Reducing leakage	20% reduction can be expected
5. Reducing air consumption by booster	About 30% reduction in the booster section
6. Introducing unit control system (Use of multiple units)	About 10% reduction in total
7. Introducing inverter machine	About 20% reduction in introduced machine
8. Others	



**\* Verify the effects after taking measures**



30 to 40% energy saving could be achieved by undertaking 1- 7 measures.

## 6 Costs and Effects Required for Improving Compressed Air System

<b>Cost</b> (All costs are relative to compressed air system improvement)	<b>Small</b>	<b>Medium</b>	<b>Large</b>
<b>Payback period</b>	Very short (less than half year)	Case by case	Max. 4 years
<b>Ease of implementation</b>	Easy (Soft technology)	Slightly difficult (Hard + Soft technology)	Difficult (Hard + Soft technology)
<b>Effect</b>	Small ~ medium	Medium	Large
<b>Measures for improving energy efficiency</b>	<ol style="list-style-type: none"> <li>1. Reduce air pressure</li> <li>2. Stop supply for not-in-use area</li> <li>3. Repair leakage</li> <li>4. Ventilate compressor room to cool down</li> <li>5. Efficient air equipment blow gun, air cylinder, nozzle, joint, valves</li> </ol>	<ol style="list-style-type: none"> <li>1. Restructure piping system</li> <li>2. Size up air-dryer and filter</li> <li>3. Size up receiver tank</li> <li>4. Use booster compressor</li> <li>5. Divide pressure</li> </ol>	<ol style="list-style-type: none"> <li>1. Make clean air system, oil-free system</li> <li>2. Provide drive multi units with multi-controller system</li> <li>3. Use VFD(VSD) compressor</li> <li>4. Restructure compressor system choose large size or divide</li> <li>5. Recover energy</li> </ol>

Selecting a good quality compressor and system is required to maximize the energy savings benefits.

Key points for selection of air compressor system:

- Compression principle (Volumetric/Centrifugal)
- Lubricant & Sealing (Oil-flooded/oil-free)
- No. of compression stages (Single stage/2-stages)
- Cooling methods (Air-cooled/water-cooled)
- Number of units (Large size/divisible system)

## 7 Findings Clarified through the Activities for the past several years

The awareness of Japanese technological products, except cars and electrical appliances, is yet to be well-established among Indian industries.



Japanese technology transfer is highly appreciated in the soft technology part; operation of technology and maintenance of facilities. While, the transfer in the hard technology part; and introduction of technological products, needs more time to gain momentum in India.

Japanese products have high quality but the products are not well promoted in India due to the differences in culture, presentation, and public relations to appeal to the consumers.



Energy-efficient products (hard technologies) and their operation technologies (soft technologies) should be equally prioritized to improve energy efficiency among the Indian industries.

HARD TECHNOLOGY & SOFT TECHNOLOGY

JAPANESE SUPPLIER



ASIAN USER

**MATCHMAKING PLATFORM**



## 8 Way forward

Based on the previous experiences, future activities for the promoting Japanese low carbon technology transfer overseas should be aimed at:

- **Raising the awareness of Japanese technologies**  
--- awareness workshop and trainings involving energy-related public institutions, local agencies, energy auditors, business associations, etc.
- **Enhancing collaboration among institutions and synergizing activities**  
--- Strengthen the relationship with the ministry of energy, other authorities
- **Strengthening the cooperation with local governments, business associations**  
--- Utilizing the finance, subsidy, etc. available locally
- **Providing a wide range of alternatives** --- Proposing solutions in combination with other products
- **Utilizing IoT technology**  
--- Monitoring and preventive maintenance by bilateral communication
- **Installing high value-added products** --- Inverter, multi-unit control operation
- **Allocating sector specific human resources** --- Activities specialized for area or industry
- **Enhancing awareness**  
--- Support to improve the awareness of energy auditors and managers
- **Marketing** --- Reviewing the price

**Importance of partners  
(IGES – TERI)**

**Strengthen the after sales service, backup supports  
--- cooperation with local distributors and enhance their technical capacities.**

## Issue of Top Priority:

# Environmental Protection and Energy Conservation (Effective use)

### Top priority

## Technology transfer of air compressor for energy saving for CO2 reduction

Activities for energy saving = Activities for CO2 emission reduction  
Environmental protection (reduction of NOx, SOx, PM2.5, etc.)

### Role of compressor manufacturer

- Developing energy-saving equipment and technologies
- Providing appropriate proposal for operation, setting, etc.
- Promoting activity for energy conservation

### Role of end users

- Improving awareness of energy-saving measures
- Eliminating waste (prevention of air leakages, etc.)
- Conducting energy-saving operations
- Undertaking training for effective usage

Utilization of IoT technology  
Collaboration with local community

**[Contributing to the global environmental protection]**



ご清聴ありがとうございました。

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Thank you for your attention.