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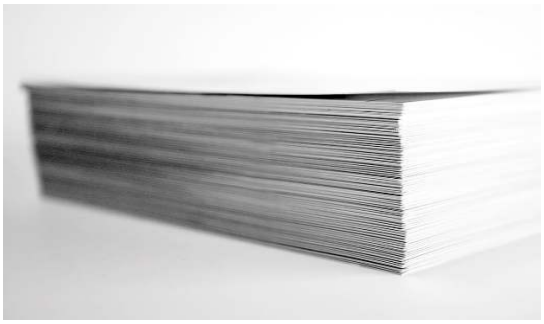
# Sustainable Public Procurement in India: Selection of priority products and preliminary market assessment

**Revised: February 2022**



# Updates in this version of the report

**The previous version of this report dated July 2021 was presented to the Task Force on Sustainable Procurement during the 7th Task Force meeting on 9th July 2021. As a result of discussion during the meeting, it was suggested by the task force to gather more information on some of the queries raised during the meeting. The information obtained by UNEP has been incorporated in the current version of the report (February 2022) under the following paragraphs**

- Para 4.3.1.1: It is informed that all units of M/s ITC have FSC certification
- Para 4.3.4.2: This para was labelled Public Demand. This has been changed to 'Demand' to showcase the procurement of paper done by the Government institutions only. Information on annual paper procurement as received from Government e-Marketplace (GeM) has been entered along with the category of paper sold on GeM.
- Para 5.7.3 (c): Number of models of Air Conditioners (ACs) registered with Bureau of Energy Efficiency (BEE) have been updated for 5-star labelled variable speed ACs. This information was received from BEE.
- Para 5.7.4: More information has been provided with respect to the presence of local content in general in the Room Air Conditioners (RACs).
- Para 5.8.1: A short brief on Annual Maintenance Cost (AMC) for RACs is added.
- An annexure (Annexure-5) has been added for 'Eco-Mark Writing and Printing paper produced for the financial year 2020-21 as per the information provided by Bureau of Indian Standards (BIS)'. Total number of annexures now stand at 13 (previously there were 12 annexure).
- Total number of tables in the report now stand at 16 (previously there were 14 tables).

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# List of Abbreviations

| | | |
|---|---|---|
| APCDs | | Air Pollution Control Devices |
| BEE | - | Bureau of Energy Efficiency |
| BIS | - | Bureau of Indian Standards |
| CFCs | - | Chlorofluorocarbons |
| CII | - | Confederation of Indian Industry |
| ECF | - | Elemental Chlorine Free |
| ESP | | Electrostatic Precipitator |
| ETP | | Effluent Treatment Plant |
| EER | | Energy Efficiency Ratio |
| EMS | - | Energy Management System |
| FSC | - | Forest Stewardship Council |
| GeM | - | Government e-Marketplace |
| GHG | - | Greenhouse gas |
| GWP | - | Global Warming Potential |
| HCFCs | - | Hydrochlorofluorocarbons |
| HFCs | - | Hydrofluorocarbons |
| ISHRAE | - | Indian Society of Heating, Refrigerating & Air-conditioning Engineer |
| ISO | - | International Organization for Standardization |
| ISEER | - | Indian Seasonal Energy Efficiency Ratio |
| LCA | - | Life Cycle Assessment |
| LCC | - | Life Cycle Cost |
| LCCA | - | Life Cycle Cost Analysis |
| LCCP | - | Life Cycle Climate Performance |
| MTPA | - | Million tons per annum |
| NCCF | - | Network for Certification and Conservation of Forests |
| NTPC | - | National Thermal Power Corporation Limited |
| ODP | - | Ozone Depletion Potential |
| ONGC | - | Oil and Natural Gas Corporation |
| PEFC | - | Programme for the Endorsement of Forest Certification |
| RAC | - | Room Air Conditioners |
| RE | - | Resource Efficiency |
| SCP | - | Sustainable Consumption and Production |
| SDG | - | Sustainable Development Goals |
| SFI | - | Sustainable Forestry Initiative |
| SME | - | Small and Medium Enterprises |
| SPP | - | Sustainable Public Procurement |
| TCO | - | Total Cost of Ownership |
| TEWI | - | Total Equivalent Warming Impact |
| TR | - | Tonnage |
| UNEP | - | United Nations Environment Programme |
| USAID | - | United States Agency for International Development |

# Acknowledgements

This report was prepared in two parts. The first part, carried out by the Confederation of Indian Industry (CII) under guidance from the United Nations Environment Programme (UNEP) and with contract management from The Energy and Resources Institute (TERI), proposed priority products and carried out a preliminary market assessment of these for sustainable public procurement. Farid Yaker from UNEP is acknowledged along with Ms. Shailly Kedia and Mr. K Rajagopal from TERI.

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The proposed sustainable public procurement framework with a focus on room air conditioners in this report has been prepared by Environmental Design Solutions [EDS] under the United States Agency for International Development (USAID) led Market Integration and Transformation for Energy Efficiency (MAITREE) program and under the guidance from United Nations Environment Programme (UNEP)

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# 1. Introduction

In September 2015, countries at the United Nations reached agreement on the Sustainable Development Goals (SDGs), which include 17 goals and 169 targets and are a roadmap for a transition to a sustainable world. One of the targets of Goal 12, Sustainable Consumption and Production (SCP), is: "Promote public procurement practices that are sustainable, in accordance with national policies and priorities". Sustainable Public Procurement is therefore seen as one of SCP's vital pillars.

Sustainable public procurement is a process "whereby public sector meets its needs for goods, services, works and utilities in a way that achieves value for money on a whole life-cycle basis in terms of generating benefits not only to the organization, but also to society, whilst significantly reducing negative impacts on the environment".[1]

In India, a large population, rapid urbanization and expanding industrial production have led to over-exploitation of available limited natural resources. Concerns regarding resource depletion and future availability have become pronounced. Also, the environmental burdens due to resource extraction, utilization, and disposal, including land degradation, biodiversity loss, as well as air and water pollution are of great concern. Enhancing resource efficiency (RE) and promoting the use of secondary raw materials (SRM) are strategies that can address these challenges by reducing the need for primary resources. SPP can play a large role in driving resource efficiency in the country and thereby reduce the need of primary resources.

Procurement is carried out by ministries, departments, municipal and other local bodies, statutory corporations, and public undertakings in India, at the Centre, State and Municipal level. The total volume of public procurement is estimated to constitute about 30 percent of the nation's GDP and hence the potential for shifting markets in the direction of a green economy is immense. The opportunity of using public procurement as a tool for advancing sustainable consumption and production is however, relatively new.

Governments across the world are leveraging their scale of procurement to fast-track adoption of sustainable goods and services. They are adopting Sustainable Public Procurement, or SPP, practices facilitated by legal reforms and policy guidelines.

Procuring environmentally friendly products and services is important for achieving sustainable development. SPP not only reduces waste generation and water consumption but also limits energy consumption and carbon emissions. It supports fair and sustainable economic growth and delivers social benefits through procurement. SPP is not just 'green' procurement but it involves socially and ethically responsible procuring while minimizing environmental impact through the supply chain and maximizing economic benefits.

## 1.1 Indian context

The Government of India launched Government e-Marketplace (GeM) for procurement of both Products & Services in 2016. GeM is an end-to-end procurement system developed for the purchase of goods and services of common use by government buyers. As per Rule 149 of the GFR-2017, procurement of Goods and Services by Ministries/ Departments of Central Government has been

[1] UN Environment Programme. 2015. Sustainable consumption and production policies. [ONLINE] Available at: https://www.unenvironment.org/explore-topics/resource-efficiency/what-we-do/sustainable-consumption-and-production-policies

made mandatory for Goods or Services available on GeM (http://ciinppc.in/, 2017). In 2017, the Procurement Policy Division (PPD) under the Department of Expenditure, Ministry of Finance, revised the General Financial Rules (GFRs) and Manuals for Procurement of Goods. The General Financial Rules (GFR), establish the principles for general financial management and procedures for government procurement.

While there is no public procurement law at the national level, the Government of India issued a Public Procurement (Preference to Make in India), Order 2017, as part of its policy to encourage 'Make in India'. "The Public Procurement Policy for Micro and Small Enterprises (MSME) issued in 2012, has mandated that every Central Ministry/Department/PSU shall set an annual goal of minimum 20 per cent of the total annual purchases from the products or services produced or rendered by MSEs. The government recently revised the order making it compulsory for all Central Public Sector Enterprises to procure 25% from MSMEs instead of 20% of their total purchases. Out of the total annual procurement from Micro and Small Enterprises, 3 per cent from within the target is to be earmarked for procurement from Micro and Small Enterprises owned by women. A sub-target of 4% out of annual procurement is earmarked for procurement from MSEs owned by SC/ST entrepreneurs. This order stipulates that preferences should be given to local suppliers in procurement".[2]

The practice of SPP has not evolved in a systematic manner, but several public-sector entities (NTPC, ONGC) and government ministries and departments (Energy, Railways, Tourism, Defence, Highways, Transport, Heavy Industries) have started considering environmental and energy efficiency criteria in their procurement decisions.

In 2008, the International Institute for Sustainable Development (IISD) and TERI brought out a report, *Sustainable Public Procurement: towards a low-carbon economy* which discussed the feasibility of SPP in the Indian context, assessed awareness, interest and concerns and investigated ongoing public sector reforms that would impact public procurement. A few years later, in 2012, a report published by the Confederation of Indian Industry in 2012, *Green Public Procurement Guidelines in India*, was the output of a consultation supported by the Ministry of Environment & Forests. This was the first step towards developing the guidelines by seeking inputs from different stakeholders, learning from experiences in other countries (Japan, EU), and identifying anticipated key issues as guidelines were developed.[3]

In 2011, The Ministry of Environment and Forest, Government of India, nominated a committee to formulate guidelines on Green Public Procurement. The committee recommended legislation to establish the necessary provisions and institutional arrangement for encouraging central government to procure greener products and services. A Draft Public Procurement Bill 2012, which states, "evaluation criteria shall relate to the subject matter of procurement and may include (a) the price; (b) the cost of operating, maintaining, and repairing goods or works…, the characteristics of the subject matter of procurement, such as the functional characteristics of goods or works and the environmental characteristics of the subject matter…". However, this bill lapsed.[4]

Somewhat more recently, in 2014, the Planning Commission documented the need for SPP as a means to developing a low-carbon economy recommending, "government and public sector

[2] https://msme.gov.in/public-procurement-policy
[3] https://esmap.org/sites/default/files/esmap-files/India%20GPP_World%20Bank.pdf
[4] Sustainable Public Procurement: A Global Review, Final Report, UNEP, December 2013

procurement officers should be empowered to buy on life-cycle cost basis".[5] In 2017, NITI Aayog published a Strategy Paper on Resource Efficiency in India which includes an action plan for promoting resource efficiency in India. SPP has been identified as one of the action points in the strategy paper.
The Indian Government set up a Task Force on Sustainable Procurement in 2018, with a notification issued on 19th March, 2018.[6] The terms of reference of this Task Force were

1. Review international best practices in the area of SPP
2. Inventorize the current status of SPP across Government organizations
3. Prepare a draft Sustainable Procurement Action Plan
4. Recommend an initial set of product/service categories along with their specifications where SPP can be implemented.

## 1.2 Approach for present study

In the present work, the selection of product categories was based on availability of data on quantities and cost, and a few other parameters (impact on energy consumption, GHG emissions).

Figure 1 shows UNEP's methodology (UN Implementation Guidelines [6]) for implementing sustainable public procurement; considering the Indian situation, an assessment of status or development of legal framework was not necessary because of the availability and provisions of the General Financial Rules. With respect to the steps in Figure 1, therefore, the present study begins at the prioritization stage: three product categories were selected, a preliminary market assessment was carried out and suggested criteria listed[7].

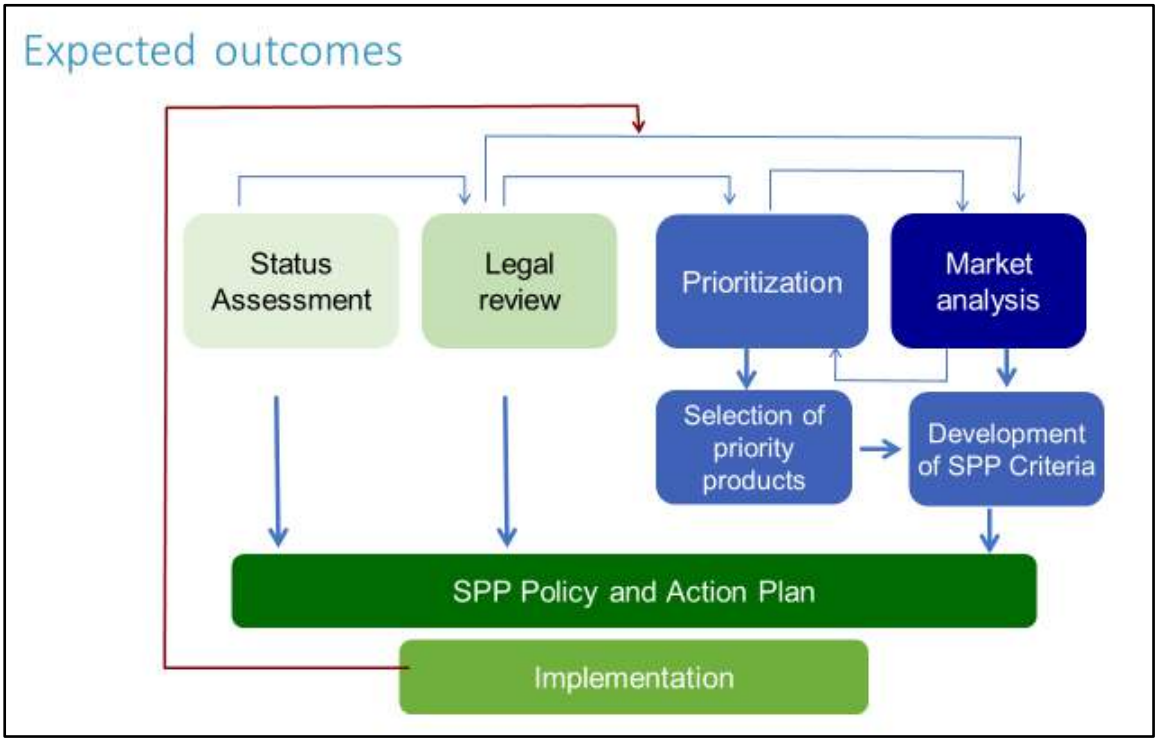


**Figure 1: UNEP Sustainable Public Procurement Approach**

[5] The Final Report of the Expert Group on Low Carbon Strategies for Inclusive Growth, Planning Commission, Government of India, 2014, available at http://planningcommission.nic.in/reports/genrep/index.php?repts=b_repgen.htm
[6] https://doe.gov.in/divisions/task-force-sustainable-public-procurement
[7] http://www.unep.fr/scp/procurement/docsres/ProjectInfo/UNEPImplementationGuidelines.pdf

# 2 Proposed Sustainable Public Procurement Framework

Green Public Procurement is a policy instrument that directs conventional procurement processes towards the purchase of products, services, and works that have a low environmental impact throughout their entire life cycle. This implies the development of scientific and easily verifiable criteria, based on a life cycle approach that can be included in procurement guidelines.

Products consume resources in different ways during their life cycles. This should be taken into consideration while determining the procurement criteria. Products can be broadly classified into five categories based on environmental impact[8]:

a) **Raw Material Intensive Product:** This product generates the most impact on the environment during the extraction of its raw materials, and such products typically consist of virgin raw materials such as smartphones.

b) **Manufacturing Intensive Product:** Such products consume the most resources and generate the most waste during the manufacturing and processing of raw materials. Such products also typically tend to have a greater social impact, for example, the manufacturing of such products could potentially disrupt the local community's access to some raw materials. Examples of such products include consumer durables, such as smartphones.

c) **Distribution Intensive Product:** These products have the maximum impact when they are distributed to different retailers in several regions. Such products also involve transportation, which adds to their environmental impact. Examples of these products include airfreight and refrigerated fresh vegetables and fruits.

d) **Use Intensive Product:** Such products have the most environmental impact during their use/operation. These products are also typically durable and go through multiple cycles of use. One example of such a product is a fossil-fuel-powered automobile. In the case of e-vehicles, most impacts are displaced upstream in the manufacturing and downstream in the dismantling and end of life.

e) **"End-of-life" Intensive Product:** These products generate the maximum impact at their end of life, are typically non-biodegradable, contain hazardous substances, and are difficult to recycle or dispose of in a safe manner. Examples of such products are different types of batteries.

The sustainability criteria within this framework have been defined on the basis of key environmental impacts across the life cycle stages of a product. In the case of room air conditioner, it includes, for example, the environmental impacts during manufacturing, energy consumption during operation and safe disposal of refrigerants at the end-of-life stage. All relevant stakeholders need to deliberate on these criteria and define the implementation roadmap for the same in a phased and time-bound manner.

The sustainable public procurement (SPP) framework proposed will make it easier for public authorities to purchase goods, services, and works that have a reduced environmental impact. The proposed SPP framework can be adopted as a standard methodology for developing the

[8] "A Review of LCA Methods and Tools and their Suitability for SMEs"; Hannele Lehtinen *et al.*, University of Manchester

procurement criteria and strategy for most products. This document proposes SPP criteria for paper, disinfectants/cleaning agents and room air-conditioners.

## 2.1 Conventional Tender Procurement Process

A conventional procurement process is a linear process wherein the products are evaluated based on initial cost. Hence all products that meet the technical specifications would qualify for financial evaluation. The product which has the least initial cost would be selected. This process does not consider the total cost of ownership or environmental impact of the product or service throughout its life cycle.

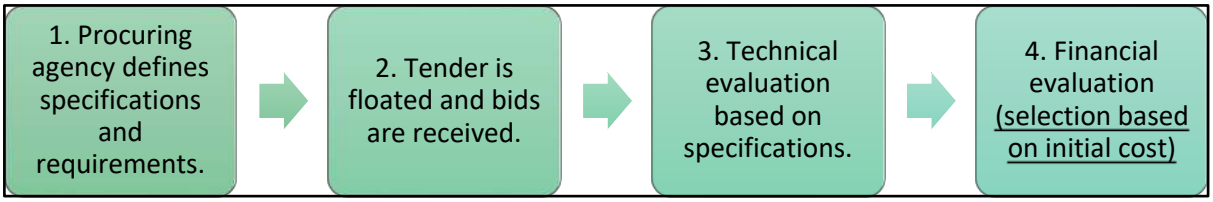


**Figure 2: Conventional tender procurement process**

## 2.2 Proposed Sustainable Public Procurement Framework

A green procurement process is a cyclic process wherein environmental aspects are included during all stages of the procurement. This takes into consideration sustainability criteria at each stage of procurement. Evaluation in this type of procurement is done by giving value to environmental concerns. Ranking of products or services is eventually based on a holistic combination of environmental attributes, quality, and cost. A green procurement cycle has been depicted diagrammatically below. In the context of India, steps 2, 3 and 4 encompass the tendering, bid evaluation and award stage. Steps 5 and 6 encompass installation, commissioning, operation and maintenance (O&M) and ongoing performance monitoring.

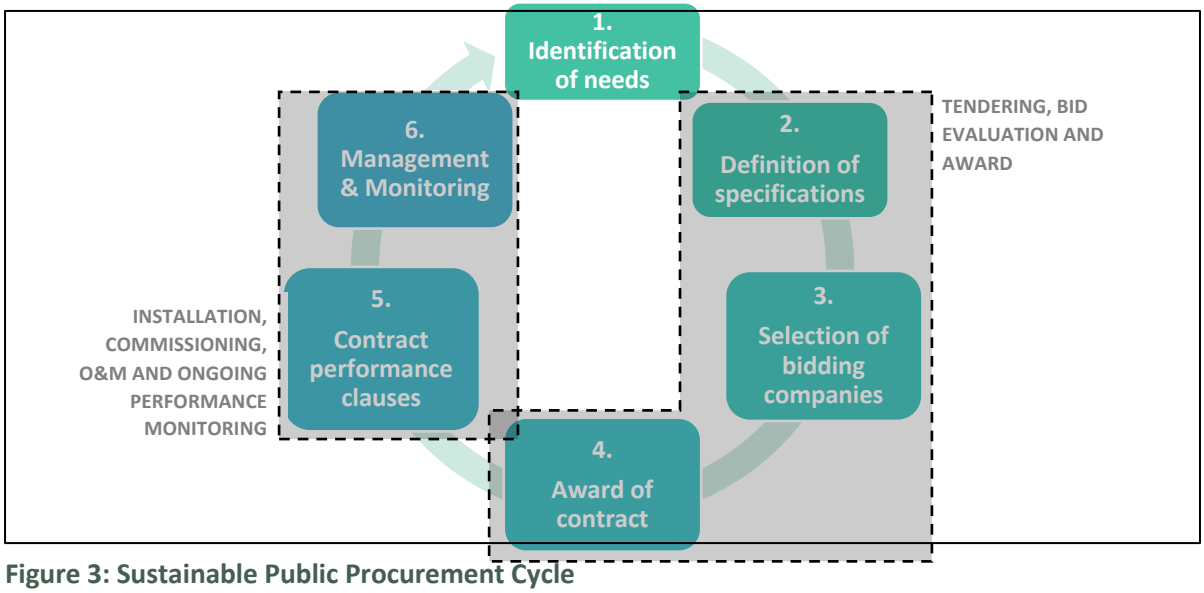


**Figure 3: Sustainable Public Procurement Cycle**

The Sustainable Public Procurement framework proposed further builds on the criteria formulated in the European Union Green Public Procurement (EU GPP) guideline.

a) **Core criteria** — which are designed to allow for easy application of SPP, focusing on the key area(s) of the environmental performance of a product or service.

b) **Comprehensive criteria** — which consider more aspects or higher levels of environmental performance, for use by authorities that want to go further in supporting environmental and innovation goals.

# 3. Selection of priority products

## 3.1 Method

The UNEP prioritization methodology could not be followed in totality so a selection process was conducted to agree on the first products for which specific sustainable purchasing criteria would be developed.

A long list was first drawn up recommending product categories to be considered for prioritizing:

- Office IT equipment
- Paper
- Cleaning and disinfecting solutions
- Office furniture
- Lighting
- Medical devices
- Stationery
- Mobile phones
- Electrical appliances
- Public works

In India, aggregated data for public purchases is not available for any product group. However, it is possible to gauge approximately, the volume of purchases (demand) and their value using data from the Government e-Marketplace, GeM, established recently. Not all products procured by public organizations are listed on this e-marketplace as the portal is still evolving.

Upon request, a table with purchasing levels for the 10 products over the last 2-3 years was made available from GeM. The list was arranged in descending order, and presented in a meeting held on June 10th, at the Ministry of Finance (minutes and attendees list are attached as Annex 1 and the table is presented in Annex 2).

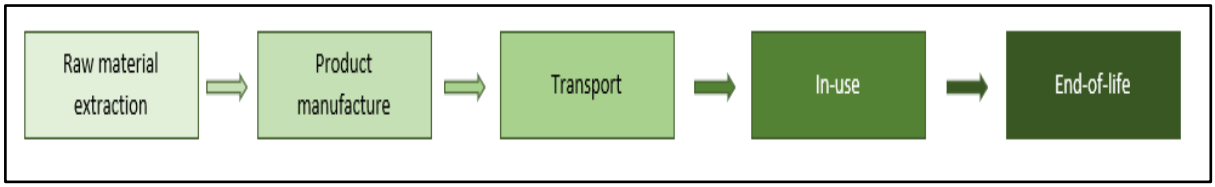


**Figure 4: Five life cycle stages of a product**

The table also contained a macro-level qualitative indication (in terms of 'small, 'medium' or 'high') of the social, environmental and economic impacts of the product groups during their extraction, manufacture, use and end-of-life (as shown in the product life cycle in Figure 4 above). Social/economic considerations particular to India such as relevance to the Make-in-India scheme, involvement of SMEs in manufacturing, and effect on livelihoods were also given weight.

Disaggregated data if accessible from GeM, would allow quantitative estimates of public demand in a particular category of product, but such data were not available during this study.

## 3.2 Shortlisted Product Categories for SPP

Writing and Printing paper, Disinfecting/ cleaning solutions and Room air conditioners were the three product groups/categories that were selected on the basis of the availability of guiding information on certifications/labels for environmental indicators, volume of purchases made, social importance/relevance, environmental impact in terms of energy consumption and GHG emissions.

Printing and writing paper was selected owing to the significant value associated with its demand, as recorded on GeM; factors such as availability of certification/ecolabels of any kind, and availability of an environmentally-friendly alternatives in the market were also given importance. In terms of end-of-life parameters, too, paper scored well, with a low environmental impact, high recyclability (and accompanying livelihood benefits to disadvantaged sections of society). It was also seen as an easy product category to work with, considering that Sustainable Public Procurement is in the early stages of development/implementation in India.

The selection of the second category, cleaning and disinfecting solutions, was based on similar considerations, even though it does not appear on the list of top 30 product categories by value: it is an easy product category to work with and the market assessment suggests that much of the manufacturing takes place in small and medium enterprises. Here, too, the benefits in terms of employment and potential to reduce environmental impact are expected to be significant if sustainability criteria can be included in the specifications (as provided for products on GeM's website).

GeM's list of top 30 product categories (in terms of value) includes a category, Heating and ventilation and air circulation, but it was not clear whether room air-conditioners were a subset, and if so, what portion of the value of purchases could be attributed to them. Despite this, the selection of room air-conditioners was based on their high and rising impact in terms of energy consumption, GHG emissions and potential for financial savings.

A preliminary market assessment was carried out for all three prioritized product categories to arrive at the SPP specifications for the three products and expert stakeholders consultation on the arrived SPP criteria based on the market assessment were attempted for the three product categories. The market analysis for Writing and Printing paper and Room air conditioners was done in depth and subsequently stakeholder consultations were held in the month of February 2021 and January 2021. For Disinfecting/ Cleaning solutions not much information could be gathered in terms of market presence, manufacturers, associations, key stakeholders etc, hence, stakeholder consultation for the Disinfecting/ Cleaning solutions also could not be carried out. It is proposed that Disinfecting/ Cleaning solutions be taken over as a part of Disinfecting/ Cleaning services for next set of prioritization exercise. Hence, for the current study only two product categories with SPP specifications have been arrived at. The two selected categories are:

1. **Writing and Printing paper**
2. **Room air conditioners**

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# 4. Writing and Printing Paper

Along with the desk research, preliminary market assessment, an expert stakeholder consultation for SPP criteria for Writing and Printing paper had been carried out in the month of February 2021. The expert consultation was attended by the paper manufacturers, associations, standard setting organizations and certification organization. The list of the participants present during the consultations are placed at Annexure-.12 For writing and printing paper, the relevant BIS standard is IS 1848 (Part 1) : 2018 and IS 1848 (Part 2) : 2018 which all suppliers must ensure is fulfilled.

The IS Standard 1848 was first published in 1961 and subsequently revised in 1971, 1981, 1991 and 2007 and had 19 different varieties of writing and printing paper. The standard was then further revised in 2018 and was split in two parts[9]. The categories covered by Part 1 are Account Book, Azure Lead, Bond, Cream Laid and Cream Wove/ Printing White/Printing Colored/Printing Offset, Printing Maplitho, Printing White Super Calendered and Typewriting Types. Part 2 covers Air Mail/ Manifold, Cartridge Drawing and Cartridge White Duplicating Absorbent and Duplicating Semi-absorbent and Poster Machine Glazed Types.

Paper is manufactured by Paper Mills that can be large, medium or small. The source of paper from where the Paper Mills obtain the raw material for manufacturing paper are threefold. These are as follows:

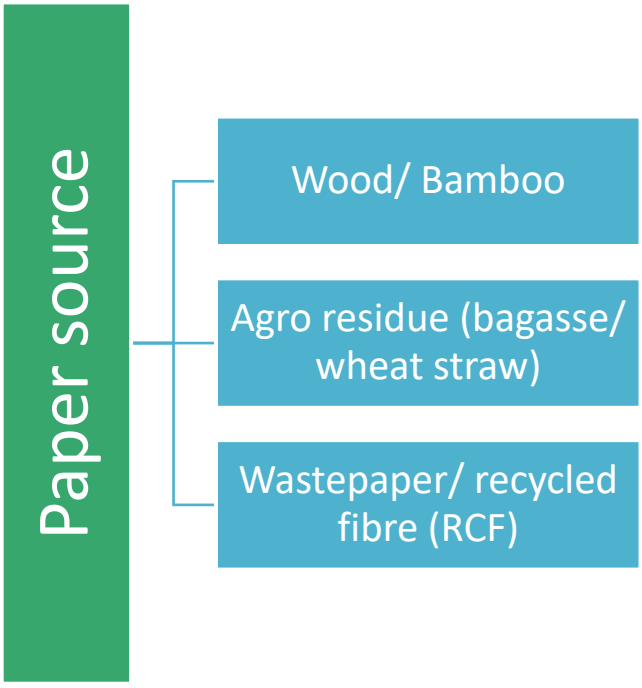


**Figure 5: Sources for Paper**

[9] Foreword, Indian Standard IS 1848 (Part 1): 2018, Writing and Printing Papers

About 41% of the paper manufactured in India uses wood as a raw material and all wood based Paper Mills are large in size. In terms of finished paper, Writing and Printing paper is one of the segments. The figure below provides the category of finished paper.

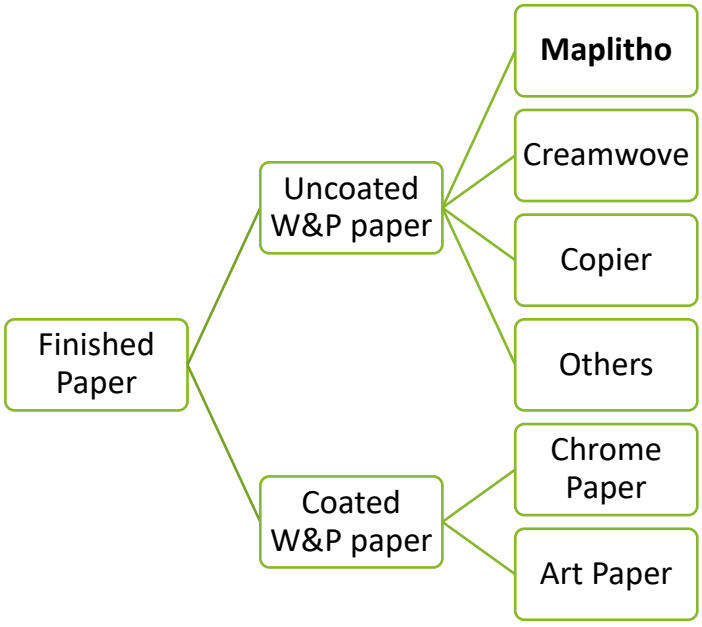


**Figure 6: Types of Finished Paper**

For the purpose of this study, Maplitho under uncoated Writing and Printing paper is considered.

## 4.1 Conventional procurement criteria

For Writing and Printing paper, the following specifications are available to choose from, on the Government e-marketplace portal:

- Conformance to Indian Standard
- Whether ISI marked: Give CML number if ISI marked, write NA if not ISI marked
- Test Method as per IS:1060: "Availability of Test Report from Central Govt/NABL/ILAC accredited lab to prove conformity to specification".
- The material shall be manufactured from pulp containing not less than 60% by mass of pulp made from materials other than bamboo, hardwoods, softwoods and reed or the material shall be manufactured from pulp made from 100% waste paper *(NOTE: these are Ecomark criteria that can be chosen by the buyer, and form part of the IS 1848 (Part 1):2018 BIS Standard)*
- Size
- GSM
- Physical characteristics

## 4.2 Sustainability criteria

These refer to requirements for qualification of the product based on its sustainability in terms of organizational, social and environmental aspects. These have been explained below and take into account the impacts produced in the social and environmental spheres at different stages of the product's life-cycle. The availability of ecolabels is also a criterion that can be used to qualify sustainability characteristics.

First, Organizational criteria are presented. The Environmental and Social criteria are then described, which are divided into Impacts, and, Criteria deriving from impacts.

### 4.2.1 Organizational criteria

In India, manufacturers should comply with government regulations as set out by the Central and State pollution Control Boards, at organizational level.

Environmental clearance: The manufacturer produces the consent clearance as per the provisions of the following Acts and respective Rules to the procuring agency:

- Water (Prevention and Control of Pollution) Act, 1974
- Water (Prevention and Control of Pollution) Cess Act, 1977
- Air (Prevention and Control of Pollution) Act, 1981
- Environment (Protection) Act, 1981
- Noise Pollution (Regulation and Control) Rules.

Energy management: In terms of energy management, the manufacturer may opt for getting the ISO 14001 (Environmental Management System) certification. The Government purchaser may ask from the manufacturer to produce the ISO 14001 certificate.

For the purpose of Writing and Printing paper, as per IS 1848 (Part 1): 2018, the paper manufacturer is required to produce to BIS the following environmental consent clearance from the concerned State Pollution Control Board

- Water (Prevention and Control of Pollution) Act, 1974
- Air (Prevention and Control of Pollution) Act, 1981
- Environment (Protection) Act, 1986

It is to be noted that the above clearances are required when the manufacturer is **seeking Eco-Mark certification from BIS.**

### 4.2.2 Environmental and Social criteria

The second part of Sustainability Criteria are the environmental and social criteria. These are further divided into: (a) Key environmental and social impacts, and, (b) Environmental and social criteria in the Indian context deriving from impacts in (a).

There is a general perception that production of paper has environmental impacts, such as deforestation and biodiversity loss, water and energy consumption (during production), use of toxins (chlorine and chlorine substances, other chemicals, especially for the bleaching process).

Therefore, in addition to conventional considerations such as price and quality, environmental conservation and social considerations must be factored in when making purchasing decisions.

It is argued that raising plantations for sourcing fiber, affects people who live off the land and the quality of the soil. Companies which are FSC certified are required to ensure through stakeholder consultations by an auditor that the farmers are being paid on time for their harvests, and that good farming practices are made available to farmers to protect the plantations as well as the rest of the land owned by the farmer.

The impacts of the manufacture of paper can be assessed using the life cycle approach. The five major life cycle stages to be considered are raw material extraction, product manufacture, transportation, in-use and disposal: the corresponding impacts are summarized below:

**Table 1: Perception on key environmental impacts associated with different life-cycle stages for paper**

| Life cycle stage | Impact | Possible SPP approach |
|---|---|---|
| Raw material extraction | • Potential loss of biodiversity: In Indian forests: even though many companies rely on agroforestry models for procurement of wood, the biodiversity loss due to monocultures (planting of one variety of crop) cannot be ignored. | Considering the hotspot with respect to paper's product life-cycle especially in the manufacturing stage. The following are recommendations:<br>1. Prioritize paper based on post-consumer recovered fibers<br>2. Prioritize paper made by companies using pulp from legally and sustainably-managed plantations since their operations are relatively better managed and farmers benefit (can look for FSC or equivalent certification, which also covers social and livelihood aspects)<br>3. Mandate elemental chlorine-free bleaching processes (manufacturer's declaration)<br>4. Enable low-energy consumption and low-emission manufacturing processes and/ or rely on renewable energies for production<br>5. Packaging should be biodegradable; multilayer packaging not to be used<br>6. Prioritize local products to minimize transportation. |
| Product manufacture | • Emissions to air and water due to chemical use during pulp and paper production: the production process uses several chemicals which are emitted into the air and released into water bodies. Chlorine-based bleaching is associated with toxic impacts on human health and ecosystems.<br>• Energy and water consumption during production: paper manufacture is a highly water- and energy-intensive process. | |
| Transport | • Emissions associated with fuel burning during transport from manufacturing unit to retailers and wholesalers<br>• Transport contributes to terrestrial acidification, photochemical oxidation formation, ozone depletion, particulate matter formation | |
| In-use | • No impact | |
| Disposal | • The environmental impact at this stage is low compared to that in other life cycle stages | |

(b) Perceived environmental and social sustainability criteria in Indian context deriving from impacts based on the table above:

- Raw material: procurement of paper based on post-consumer recovered paper fiber (recycled paper) or paper from legally and sustainably harvested wood to get preferential treatment.
    - Sustainable source of raw material (if wood-based): The product be certified for sustainable procurement of raw material (such as Forest Stewardship Council (FSC), Programme for the Endorsement of Forest Certification (PEFC), Sustainable Forestry Initiative (SFI); Network for Certification and Conservation of Forests (NCCF).

- Process: Only paper that is certified to be Elemental Chlorine Free (ECF) or Total Chlorine Free (TCF) to be procured.
- Packaging: The paper to be packaged in material that is recyclable/reusable or biodegradable.
    - If plastics are used for packaging, then additional to post-use recyclability, the plastic should have a minimum amount of recycled content.
    - Multi-layer packaging should not be used.
- Adherence to labor law standards: compliance with the Indian Labor Law (for establishments in India) or International Labor Organization (for international establishments), as specified within the provisions of the various Rules and Regulations prepared from time to time.
- Make in India: companies with manufacturing facilities in India get preference. Also, government has issued a notification requiring a minimum percentage of local content in the product. For writing and printing paper the minimum content is 80%) (Annex 3).

However, based on the expert consultations, it was found that the paper manufacturing in reality does not entail negative impact on the environment and in fact is socially inclusive. Central Pulp and Paper Research Institute (CPPRI), Saharanpur provided the following reality check in response to the general perception about paper industry.

**Table 2: General Perception vs. Reality Check**

| **General Perception about Paper Industry** | **Reality Check** |
|---|---|
| Paper Industry if responsible for Deforestation | Industry led Agro/ farm forestry in collaboration with farmers has brought over 900,000 hectares under pulp wood plantations (mainly degraded marginal land of farmers).<br><br>At the current estimate, industry is using over 90% of the total wood requirement from Agro/ farm forestry |
| A Wood Negative Industry | Paper industry is wood positive, i.e., the industry grows more trees through its Agro/ farm forestry initiative than it harvests.<br><br>Pulp and paper industry consumes only 3% of the national requirement of wood while major consumption is as fuel wood (89.5%) and timber (7.5%) |
| Unsustainable Industry | Major raw materials are wood, waste paper and Agro based, which can be easily regenerated.<br><br>The industry recycles the waste paper that is generated.<br><br>The industry also uses agricultural waste which otherwise would have been burnt in the fields.<br><br>Paper is biodegradable renewable, recyclable and sustainable. |
| Technically obsolete | Most of the large integrated mills wood /Agro are using modern fiber line technology including oxygen delignification, New Generation Pulp washers , ECF bleaching etc.<br><br>It is now mandatory for Agro based mills to install chemical recovery system |

| General Perception about Paper Industry | Reality Check |
|---|---|
| | RCF based paper mills are switching over to high consistency pulper |
| Water Intensive | The industry only consumes 10 % of the total water used for paper making.<br><br>The fresh water consumption norms are one of the stringent norms around the globe<br><br>Increasing number of mills are recycling /reusing the treated effluent / back water back into the process |
| Highly Polluting Industry | Most of the mills have upgraded ETPs specially the mills in Ganga River basin OCEMS for treated effluent quality monitoring and air emission monitoring mandatory requirement<br><br>APCDs like Multi Cyclone / ESP mandatory at boilers for control of pollutants ETP sludge / fly ash used to produce value added products |
| Associated with solid waste generation | Fly ash mostly being sold to brick making or cement industry.<br><br>ETP sludge used for board making Lime sludge reburnt in lime kiln to regenerate lime which is used for producing white liquor |
| Energy Intensive | Integrated paper mills in India generate 60% of the power they use by utilizing the black liquor from the pulping process.<br><br>In the first two cycles of PAT (Perform Achieve Trade) Scheme of the Government (all large Paper Mills are Designated Consumers under the PAT Scheme), the Paper Industry significantly over-achieved the mandated stiff targets for energy saving. |

Regarding the use of chlorine for bleaching purposes, it was found out through stakeholder interaction that large paper mills do not use chlorine and that the paper produced is ECF. The recycled fiber based paper mills do not use chlorine for bleaching. Hydrogen peroxide is being used for bleaching purposes in manufacturing of paper.

### 4.2.3 Availability of standards/labels in India/Internationally

Eco-labels are believed to be an important market-based instrument to influence the behavior of consumers and industries in favor of environmentally friendly products and thus contribute to environmental conservation.

In 1991, India launched its own eco-labelling scheme, Ecomark. Although the Ecomark is similar in many ways to eco-labels of other countries, it differs from most in one important aspect: while eco-labels in most countries are awarded solely on the basis of environmental considerations, in India they were linked to the quality of products. However, the scheme did not catch the buyer's fancy despite being used for several years.

For Writing and Printing paper, IS 1848 (Part 1): 2018 and IS 1848 (Part 2): 2018 both entails the same Eco-Mark requirement. These are listed below:

**Table 3: Eco-Mark criteria for Writing and Printing paper as per IS 1848**

| General Criteria | Specific Criteria |
|---|---|
| The product shall conform to the requirements for quality and performance prescribed in IS 1848. | The paper and paper boards manufactured out of pulp containing not less than 60 percent by weight of pulp made from materials other than bamboo, hardwoods, softwoods and reed. |
| The manufacturer shall produce to BIS, the environmental consent clearance from the concerned State Pollution Control Board as per the provisions of *Water* (*Prevention and Control of Pollution*) *Act,* 1974 and *Air* (*Prevention and Control of Pollution*) *Act,* 1981 along with the authorization, if required, under the *Environment* (*Protection*) *Act,* 1986 and the Rules made there under, while applying for ECO-Mark. | Recycled paper and paper board must be made from 100 percent waste paper. |
| | *Packaging Requirements*<br>For ECO-Mark, the product shall be packed in such packages which shall be recyclable/reusable or biodegradable. |

For IS 1848 (Part 1): 2018, 26 licenses for Eco-Mark have been awarded by BIS. However, the production capacity of the firms having the Eco-Mark licenses could not be ascertained.

## 4.3 Preliminary market assessment

Data and market information were gathered directly from the Indian Paper Manufacturer's Association (IPMA), Indian Agro & Recycled Paper Mills Association (IARPMA), paper manufacturers Bureau of Indian Standards (BIS), Central Pulp and Paper Research Institute (CPPRI), Network for Certification and Conservation of Forests (NCCF), through n face-to-face meetings, telephone conversations, written correspondence and expert stakeholder consultations..

Secondary data in terms of procurement data, manufacturers list was collected from Government e-Marketplace, websites of companies and business-and-economy-related newspaper articles.

### 4.3.1 Features of the Indian market

Writing and printing paper (commonly referred to as 'Maplitho', an uncoated paper used to make textbooks, notebooks, from hardwood pulp) is available in the Indian market and manufactured in India. Annual paper production is 19.36 million tons per annum (MTPA)[10] of which 35% i.e. 6.78 MTPA is of the writing and printing grade. Majority of this is elemental chlorine-free (ECF) and so belongs to the 'sustainable' category. There is no certification for elemental chlorine free processes – the manufacturer's declaration is the only indication that bleaching is carried out using environmentally-friendly processes. However, it is worth noting that out of the 6.78 MTPA of Writing and Printing paper, only 2.78 MTPA is being produced from wood-based pulp (fresh pulp) by the large paper mills. Remaining production is done by medium scale or small-scale paper mills from Agro based and Recycled fiber based raw material.

[10] Annual Report 2019-20, Central Pulp and Paper Research Institute (CPPRI), Saharanpur, Uttar Pradesh; https://cppri.res.in/sites/default/files/Annual%20Report_English.pdf


**Figure 7: Source wise production quantum of Writing and Printing paper**

#### 4.3.1.1 Forest certification through FSC / PEFC certification

Forest certification is a voluntary process whereby independent third party assess quality of forest management and production against a set of requirements- standards predetermined by a certification organization. Globally, 11% of the total forest cover (about 525 million hectare) is certified either through FSC or PEFC certifications. In India, only 0.54 million hectare of the total forest cover (less than 1% of the total forest cover) is certified. The certification in India is mainly undertaken by a few paper mills for export purposes as some importing countries have mandated the same. Domestic demand in India for FSC / PEFC certified Paper is virtually non-existent. Since certification entails some costs, some rise in price cannot be ruled out once domestic demand for the same emerges. Wood procured from Mandis or veneer waste is not considered eligible by any of the FSC Certifying Agencies. Social forestry model is only prevalent in India and therefore FSC certification norms exclude most of the wood waste and wood grown under social forestry model. FSC certified paper would therefore have to be manufactured from imported FSC compliant pulp, which is against the spirit of 'AatmaNirbharBharat'. There is a need for the FSC certifying agencies to include social forestry wood purchased from Mandi / Traders and industrial bi-products like chips in the FSC Scheme. FSC-certified paper is demanded by companies importing paper from India only. Within the country as of now there is little to no market for purchase of paper that is FSC/PEFC certified. M/s ITC, one of the largest producer of writing and printing paper informed that all its units has FSC-CoC (chain of custody)[11].

The Network for Certification and Conservation of Forests (NCCF) certification is a PEFC endorsed scheme. It was registered as a society in 2015 and is a member of PEFC council for India. The core working area for NCCF are sustainability standards, Policy advocacy, Natural resource conservation and Management, Multi stakeholder engagement and capacity building, and is the only Indian scheme of forest certification. It is evident from the above facts that NCCF is comparatively new in India and will require willingness from the paper manufacturing mills and a push from market to have a firmer foundation in terms of certifications.

[11] For more information the website of ITC https://www.itcpspd.com/FSC.aspx (accessed on 7th February 2022) can be checked.

#### 4.3.1.2 Social Sustainability

Wood-based Paper Mills have Agro forestry roots and strong backward linkages with the farming community, from whom wood, which is a key raw material, is sourced. Of the total demand for wood, over 90% is sourced from industry driven Agro / farm forestry, with the rest from Government and other sources. Substantial amounts have been spent by the paper industry on plantation R&D, production of high quality tree clonal saplings which are disease and drought resistant and can be grown in a variety of Agro climatic conditions, technical extension services to improve Agro / farm forestry services, hand holding of marginal farmers over a gestation period of 4-5 years. A large part of this wood is grown in backward marginal / sub-marginal land, which is potentially unfit for other use. Farmers grow trees (trees-outside-forests) as any other crop and their harvest is sold to Paper Mills, apart from other industries. This shows that India's Paper Industry is wood-positive, that is, it plants more trees than it harvests.

An estimated 500,000 farmers are engaged in growing plantations. With the efforts of wood-based Paper Mills, on an average, about 125,000 hectares are being brought under Agro / farm forestry on an annual basis, with around 1.2 million hectares on a cumulative basis across the country. This has generated large employment opportunities for the local community, especially in the rural areas, and also significantly supplemented the income of farmers. Additionally, this has had significant environmental benefits in terms of increase in country's green / tree cover, carbon sequestration, restoration of degraded land, etc.

#### 4.3.1.3 Exclusion of Wood Based paper from Eco-Mark

The Eco-Mark is applicable for manufacturer producing paper from Agro based and Recycled fiber based raw material. For Wood based production manufacturers cannot get Eco-Mark certification. The specific requirements under the Scheme (pulp containing not less than 60% by weight of pulp made from materials other than bamboo, hardwoods, softwoods and reed) completely excludes wood-based Paper Mills. As a result, wood-based Paper Mills are ineligible for ECO-Mark certification from BIS. There is a need to update the Eco-Mark scheme for writing and printing paper so as to include the wood-based paper.

#### 4.3.1.4 Procurement from GeM

The Government e-Marketplace (GeM) portal has Eco-mark paper listed in the catalogues. As per the data provided by GeM, it was seen that approximately 90% of the total procurement of writing and printing paper is for Eco-mark paper.

### 4.3.2 Availability of sustainable options

From the above discussions the following picture emerges in terms of the sustainable options for Writing and printing paper:

- The writing and printing paper is available in the ECF category. Both large, medium and small paper mill produces ECF paper;
- FSC/ NCCF certification is available for domestic use, however some increase in cost cannot be ruled out. The NCCF certification is comparatively new in India;
- Eco-Mark paper exists and being a commonly used product, is being procured in large percentage from GeM.

### 4.3.3 Existence of EMS

Large, integrated pulp-and-paper manufacturers are all EMS 14001-compliant, but parallel data are not available for SMEs.

### 4.3.4 Assessment of demand

#### 4.3.4.1 Global demand

In the last ten years the domestic demand for paper has doubled from around 9 million tons in FY 2007-08, to over 19.36 million tons in 2019-20. Demand is expected to grow at a CAGR of 6-7% and reach about 24 million tons by FY 2024-25. However, due to the COVID-19 pandemic, the paper industry has been hit hard in 2020-21 due to the shortage in demand and production. In 2020, the Indian paper industry had been operating at less than 50% of its capacity[12], though it is expected that in 2021-22 the industry may be back on track. The per capita consumption of paper from 13-14 kg per annum compared to a global average of 57 kg is expected to rise to 17 kg by 2024-25.

#### 4.3.4.2 Demand

Paper is a commonly used goods that is largely procured from Government e-Marketplace (GeM)[13]. The information on annual value of paper procured from Government e-Marketplace and other procurement portals is shown in the table below.

**Table 4: Annual paper procured (in INR) through GeM and other procurement portals**

| Portals | Annual procurement of Ecomark paper (INR) | Annual procurement of Non Ecomark paper (INR) | Total, Cr (INR) |
|---|---|---|---|
| Government e Marketplace (GeM)* | 396.4 Cr (65% of the total) | 139.2 Cr (35% of the total) | 535.6 |
| Central Public Procurement Portal (CPPP)** | No Data Available | 3.5 Cr Thermal Paper | 3.5 |
| Railways E-Procurement System** (IREPS) | No Data Available | 1.1 Cr Printing Paper, | 1.1 |
| | **396.4** | **143.8** | **540.2** |

*Order Value in INR (Sep 2020 - Aug 2021)
** Order Value in INR (May 2020 - March 2021)
From the above table the major procurement of paper is for Eco-Mark paper. Value of procurement of paper from other procurement portals is even less than 1% of the total annual requirement. For printing paper it is only 0.20%.The table below shows the kind of paper sold on GeM portal

**Table 5: Category of paper sold on GeM**

| Sub Category | Subcategory ID | Without EcoMark | With EcoMark | Grand Total |
|---|---|---|---|---|
| Offset Paper-Is: 1060, Is:1848, Is 6211 | home_pape_indu_news_offs | 1,01,24,564 | | 1,01,24,564 |
| Packaging Paper and Kraft Paper-Is 1397 | home_pape_indu_pape_pack | 2,81,79,192 | | 2,81,79,192 |

[12] https://www.thehindubusinessline.com/companies/covid-hit-paper-industry-on-consolidation-mode/article32356651.ece
[13] As per Rule 149 of General Financial Rules (GFR),2017 it is mandatory for Central Government Ministries/ Departments to procure Goods or Services from GeM portal, subject to its availability on the portal

| Sub Category | Subcategory ID | Without EcoMark | With EcoMark | Grand Total |
|---|---|---|---|---|
| Tissue Papers-Is 14461 | home_pape_indu_tiss_tiss | 3,68,63,247 | 1,59,36,209 | 5,27,99,456 |
| Art / Craft Paper as Per Is:4658 - Category May Be Removed From Marketplace | home_pape_pape_nove_artc | 32,20,57,358 | 9,46,016 | 32,30,03,374 |
| Art Or Craft Paper As Per Is: 4658 -- Category May Be Removed From Marketplace | home_pape_pape_nove_arto | 3,48,17,160 | | 3,48,17,160 |
| Computer Paper-Is 12766, Is 9055, Is 1060, Is 1064 | home_pape_pape_writ_comp | 23,31,16,579 | | 23,31,16,579 |
| **Maplitho Paper as Per Is:1848(Part 1)** | **home_pape_pape_writ_mapl** | **18,27,67,030** | **2,11,71,53,137** | **2,29,99,20,167** |
| Plain Copier Paper-Is:14490 | home_pape_pape_writ_plai | 54,44,09,594 | 1,83,01,07,222 | 2,37,45,16,816 |
| **Grand Total** | | 1,39,23,34,725 | 3,96,41,42,585 | 5,35,64,77,310 |

For the Writing and Printing paper (Maplitho), the value of annual procurement is INR 229 crores. Out of this, **92%** is for Eco-Mark paper.

As per the information received from BIS, the annual production of Eco-Mark paper for the financial year 2020-21 by the Eco-Mark licensed manufacturers has been **77845.88 metric tonne**. For details please refer to Annexure-5.

### 4.3.5 Cost differential between 'sustainable' and 'normal' products

Prices of a ream of paper vary significantly depending on the paper quality. Preliminary research indicates that it could range from INR 290 to 500. The 'normal' counterpart is cheaper by about Rs 20-25/- a ream. FSC certified paper is about 5% more expensive than non-certified paper. Interviews with company managers concluded that Indian customers were not willing to pay a premium for FSC certified paper: it is mostly exported. The Eco-Mark paper procured through GeM for A4 size paper is around 11% costlier than the conventional paper and is around 22% costlier for Eco-Mark A3 size paper as compared to non-Eco Mark paper.

**Table 6: Typical cost of FSC-certified and non-certified paper and Eco-Mark and Non-Eco Mark paper**

| Type of paper | Cost per ream (Rs.) | Remarks |
|---|---|---|
| FSC-certified printer-copier paper | 245/- to 350/- | |
| Non-certified printer-copier paper | 230/- to 330/- | Rs. 20 to 25 cheaper per ream (About 5% cheaper) |
| A4 Eco-Mark paper procured from GeM | 250/- | |
| A4 Non- Eco Mark paper procured from GeM | 224/- | 11.6% cheaper per ream as compared with Eco Mark variant |

| Type of paper | Cost per ream (Rs.) | Remarks |
|---|---|---|
| A3 Eco-Mark paper procured from GeM | 232/- | |
| A3 Non Eco-Mark paper procured from GeM | 190/- | 22.10% cheaper per ream as compared with Eco-Mark variant |

## 4.4 Recommended procurement criteria

Based on the above facts and discussions, the following Sustainable Public Procurement (SPP) criteria for Writing and Printing paper are suggested:

- **Procurement of writing and printing paper that is FSC or NCCF certified; or**
- **Procurement of Eco-Mark paper**

The procurer may opt for any one of the categories. Another segment of paper is Photocopier paper that has exactly same Eco-Mark criteria as per IS 14490-2018. The above SPP criteria can be extended to the photocopier paper as well.

The Department of Promotion of Industrial and Internal Trade (DPIIT, and earlier known as DIPP, Department of Industrial Policy and Promotion) issued Order No. P20028/19/2018-Paper dated 4th February 2021, under Public Procurement (Preference to Make in India) Order, 2017, mandating a minimum local content of 80%[14] for writing and printing paper and 75% for Copier paper (cut size). The order also states that there exists sufficient local capacity and local competition and only Class-I Local Suppliers shall be eligible to bid for all public procurements irrespective of purchase value.

[14] https://dipp.gov.in/sites/default/files/Paper%20Sector%203a%20notification%20dated%2004022021.pdf

# 5 Room Air-conditioners

The air-conditioning market in India has been growing faster than the other sectors, at an average rate of 18-20% over the last decade.[15] In 2017, the room air conditioner (RAC) market size was 7.6 million. Room air-conditioners were selected as one of the top three products based on the following three key reasons:

1. Room air conditioners have a high environmental impact across all its life stages.
2. Individual air-conditioners have high acquisition (initial) costs.
3. Integrated efforts of public entities such as the Bureau of Indian Standards (BIS) and the Bureau of Energy Efficiency (BEE), towards the procurement of efficient room air conditioners, provides for an enabling environment and ensures ease of implementing a sustainable public procurement for this product.

The sustainable public procurement framework including defining the criteria, possible methods for technical and financial evaluation for room air conditioners have been provided in the following section. A preliminary market readiness study (provided in the subsequent section) also substantiates the viability of the criteria outlined in this framework for room air conditioners.

## 5.1 Scope

Cooling can be procured as a “product” or as a “service”. In a mature market, Cooling as a Service (CaaS) model would enable procurement agencies to base their decision on life-cycle costs rather than on the acquisition price of the cooling equipment. CaaS involves end-user paying for the cooling they receive, rather than the physical product or infrastructure that delivers the cooling.

Considering the current procurement standards, this section covers sustainable procurement based on the purchase of room air conditioners as a “product”. However, in the future, criteria can also be expanded to consider for cooling as a service.

Further, criteria have been developed for room air conditioners with a capacity less than three tons. The market readiness analysis and technical specifications have been developed based on a 1-1.5-ton room air conditioner, however, the same methodology and criteria can be referred to for room air conditioners of higher capacity. The definitions and energy efficiency criteria refer to the periodically updated Bureau of Energy Efficiency (BEE)’s labeling program for room air conditioners.

**The preliminary core and comprehensive criteria have been laid out after discussion with expert consultation with the stakeholders (including procurement agencies, manufacturers, technology providers, end-users, etc) that was done in the month of January 2021. The final criteria have been identified after the feedback received and deliberation done with all stakeholders. The list of participants during the stakeholder consultation is placed at Annexure-13.**

[15]Business Standard – “Consumers switch to inverter ACs as energy efficiency gains ground”; September 2013

## 5.2 Key Environmental Impacts

Air-conditioning, though sought after to ensure indoor comfort across seasonal variations, it has also been found to have many detrimental effects on the environment. In a predominantly cooling oriented climate like India, air conditioning represents 55-60% of the building energy loads. Air conditioning also pumps out heat straight into the atmosphere, thereby making urban environments hotter. These cooling systems also use greenhouse gases, that contribute towards global warming potential. Based on the literature review of available research papers, the main environmental impacts of a room air conditioner across its life cycle stages are summarized in the table below. The table also presents the Sustainable Public Procurement (SPP) approach to mitigate or reduce these key environmental impacts.

**Table 7: Environmental impacts across life cycle stages of room air conditioners**

| Life cycle stages | Key Environmental Impacts | Sustainable Public Procurement (SPP) Approach |
|---|---|---|
| Manufacturing phase | Use of energy, finite resources and harmful emissions related to the production of parts of the air conditioner (raw material acquiring, manufacture of components) | Procurement of air conditioners from suppliers and manufacturers that use recycled materials. |
| | Air, soil and water pollution, ozone formation (smog), bioaccumulation due to hazardous constituents. | Procurement of air conditioners from suppliers and manufacturers that follow relevant Environmental Protection and Waste Management Rules. |
| Use phase | Energy consumption and resulting Carbon Dioxide ($CO_2$) emissions during the use phase of the air conditioner. | Minimize $CO_2$ emissions during the use phase. |
| | Leakage of refrigerants with high global warming potential (GWP) over the product life. | Minimize or eliminate the use of refrigerants with high global warming potential (GWP). |
| | Negative impact on the health of employees due to noise, causing stress for those sensitive to such sounds. | Minimize Product Noise and adhere to the relevant IS codes. |
| End-of-life phase | Generation of waste material including that for packaging and final disposal. | Procurement of air conditioners from suppliers and manufacturers that follow the sustainable end of life practices. |
| | Refrigerant disposal at end of life. | Minimize or eliminate the use of refrigerants with high global warming potential (GWP).<br>Procurement of air conditioners from suppliers and manufacturers that follow the sustainable end of life practices. |

## 5.3 Conventional versus Sustainable Public Procurement Framework

The Government e-Marketplace (GeM) is a portal to facilitate online procurement of common use goods and services required by various government departments, organizations, and public sector units. GeM aims to enhance transparency, efficiency, and speed in public procurement. An outline of

the conventional framework in the context of the proposed sustainable procurement framework has been provided under three heads:

a) Procurement cycle – A comparative between the existing procurement process and the green public procurement process.
b) Procurement specifications – A comparative of the existing specifications requested by procurement agencies for room air conditioners; and the recommended specifications and additional requirements when considering environmental impacts through the SPP approach.
c) Procurement options – A summary of the multiple procurement options offered by GeM, and a perspective of evaluation of bids from the SPP approach.

### 5.3.1 Procurement Cycle

#### 5.3.1.1 Conventional Approach

A conventional procurement process is a linear process wherein the room air conditioners are evaluated based on the acquisition cost. Hence all air conditioners that meet the technical specifications would qualify for financial evaluation and the air conditioner which has the lowest initial cost would be selected. This process does not consider the total cost of ownership or environmental impact of the air conditioner through its life cycle.

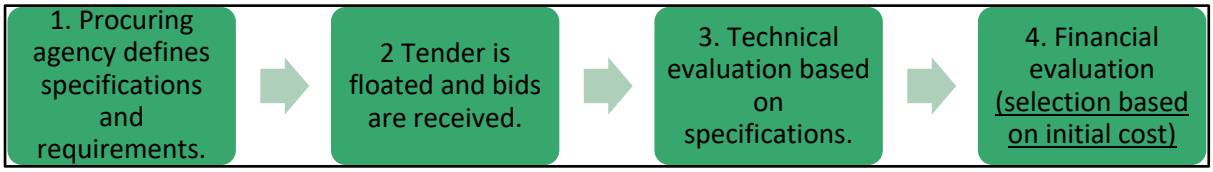


**Figure 8: Conventional tender procurement approach**

#### 5.3.1.2 Recommended Sustainable public procurement approach

A green procurement process is a cyclic process wherein environmental aspects are included during all stages of the procurement. Evaluation in this type of procurement is done by giving value to environmental concerns. Ranking of the air conditioner will be based on a combination of environmental attributes, quality, and cost. Sustainable criteria have been developed for each of the stages in the procurement cycle. These preliminary criteria would require feedback from all stakeholders to enable formal drafting. A diagrammatic representation of the Sustainable Public Procurement framework has been outlined below.

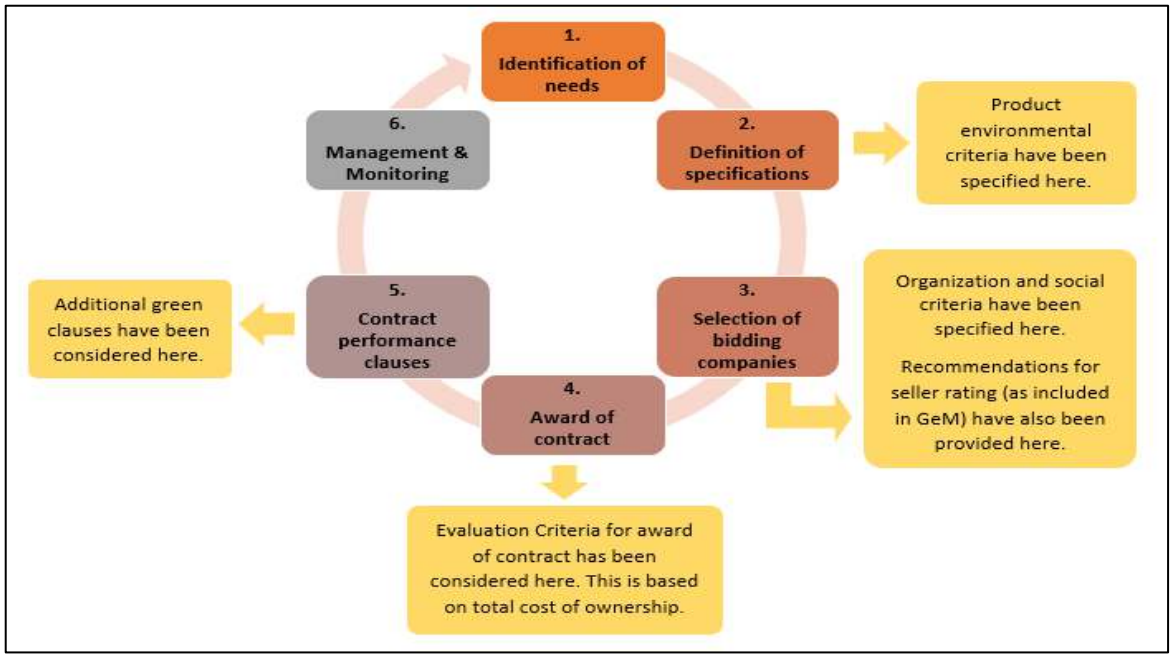


**Figure 9: Sustainable Public Procurement Cycle**

The recommended evaluation process considers total cost of operation which considers real costs over the duration of ownership of the air conditioner. Reduced energy costs due to use of energy efficient air conditioners are thereby included while comparing products. Further, in a mature market, it is also recommended to have a weighted average score for final product selection that considers all environmental and financial considerations.

### 5.3.2 Recommendations on Procurement Specifications

Conventional specifications are usually based on minimum functional and quality requirements of the product. The specifications requested on the Government e-Marketplace portal have been tabulated below. These specification guidelines help procurement agencies to evaluate air conditioners. Based on the Sustainable Public Procurement framework, the table indicates revisions against the existing specifications and selection options on the Government e-Market (GeM) portal to enable sustainable procurement. The detailed recommended specifications to GeM have also been provided in Annexure 9 of this document. In this scenario, inefficient room air conditioners will automatically not be listed for selection or evaluation.

**Table 8: Comparison of the procurement specifications requested from the bidder in a conventional framework vis a vis a sustainable framework**

| Conventional Public Procurement | Sustainable Public Procurement |
|---|---|
| Type of air conditioner | Same as conventional |
| The technology of air conditioner (Fixed / Variable) | Only variable speed (inverter)-based technology to be considered. |
| Nominal cooling capacity in Ton / (kcal/hr) | Same as conventional |
| Coil Material | Same as conventional |
| Eco-friendly refrigerant (Yes/No) | An option can be provided to select the refrigerant type. Only refrigerants with low GWP to be listed for selection. |
| Minimum length of copper pipe and suitable connecting electrical cable for installation and commissioning | Same as conventional |

| Conventional Public Procurement | Sustainable Public Procurement |
|---|---|
| Packing List | |
| Any other Features | Additional specifications based on product environmental criteria can be added.<br>Example:<br>• Rated ISEER<br>• Take-back or buy-back option available with the manufacturer.<br>(This has been detailed under the section on technical specifications) |
| BEE Star Rating (1-star to 5-star) | BEE star rating of 5-star air conditioners to be considered. |
| Conformity to Indian Standard IS 1391 (Revised) | Same as conventional |
| Warranty on Machine (Number of Years) (Starting from one year) | The minimum number of years for the warranty on the machine can be increased to ensure longevity and durability of the product. |
| Warranty on compressor (Number of Years) (starting from five years) | Same as conventional |
| Nature of Installation and Commissioning services | To be evaluated based on the nature of the service requested. |

### 5.3.3 Procurement Options

Within the existing GeM framework, there are five procurement options.

a) Direct Purchase - For amounts Less than INR 25,000.
b) L1 – For an amount between INR 25,000 and INR 500,000, procurement based on the least cost.
c) Bid /Reverse Auction (RA) - Procurement via Bid/RA to get the best price quote bid to RA option is also available after evaluation in bid.
d) The intent of Buying PAC (Proprietary Article Certificate) - Procurement of specific products as per requirement is also possible.
e) The intent of Buying Bid - If the objective is to go for bid (only bid) – there is no need for comparison.

In option (a) and (b) the amounts may be updated from time to time.

In all the options, it is observed that the room air conditioners with the least acquisition price will be selected. In option (d) there is a possibility to evaluate based on environmental attributes of the room air conditioner. Recommendation on evaluation for air conditioner procurement has been provided under the award criteria in the subsequent section.

## 5.4 Recommended Sustainable Public Procurement Framework and Criteria for Room Air Conditioners

The Sustainable Public Procurement framework recommended takes off from the conventional criteria as per the existing GeM procurement framework and includes additional criteria (core and comprehensive) as formulated in the European Union Green Public Procurement (EU GPP) guideline.

1. **Conventional Criteria** – Business as usual practices based on the existing GeM procurement framework.

2. **Core criteria** — are designed to allow for easy application of SPP, focusing on the key area(s) of the environmental performance of a product.
3. **Comprehensive criteria** — consider more aspects or higher levels of environmental performance, for use by authorities that want to go further in supporting environmental and innovation goals. This can be in the form of stringent specifications, method of evaluation for bids and products, etc.

The baseline criteria are the conventional criteria. The core and comprehensive criteria derived are based on the efforts of public entities such as the Bureau of Indian Standards (BIS) and the Bureau of Energy Efficiency (BEE) towards existing star labeling and proposed eco-labeling criteria development for air conditioners. The different criteria are explained across the sustainable public procurement cycle. The detailed recommended specifications to GeM have also been provided in Annexure 9 of this document.

### 5.4.1 Identification of Need

Within the framework, identification of need would include – quantity, type of air conditioner, capacity, nature of service -replacement or new procurement, etc. Based on the need, the specifications would be developed, tenders would be floated, contract clauses be formulated, bids evaluated and products and/or services be procured.

Sustainable Public Procurement Framework discourages procurement of fixed speed air conditioners and encourages procurement of energy-efficient options.

**Table 9: Criteria for identification of need**

| Conventional Criteria | Core Criteria | Comprehensive Criteria |
|---|---|---|
| A. **Product Type**<br>The inverter air conditioner (variable speed) is more energy-efficient than a fixed speed air conditioner. | | |
| Within the GeM framework, purchase of all types of air conditioners is possible (Fixed and variable) | Inverter (variable speed) air conditioners (unitary or split system as per the requirement) have been recommended.<br><u>Verification Instrument:</u><br>Product code and specification sheet. | |

### 5.4.2 Defining Specifications

Technical specifications have been determined based on key environmental impacts across all life cycle stages of room air conditioners. The product-specific environmental criteria and specifications have been specified below.

**Table 10: Criteria for defining specifications**

| Conventional Criteria | Core Criteria | Comprehensive Criteria |
|---|---|---|
| **A. Safety and Performance** | | |
| Air conditioner shall conform to the requirements for quality, safety and performance prescribed in IS 1391 Part 2 titled Room Air Conditioners: Part 2 Split Air Conditioners Revised /IEC 60335-2-40 (under preparation) and all other requirements specified in this standard.<br><br><u>Verification:</u> | | |

| Conventional Criteria | Core Criteria | Comprehensive Criteria |
|---|---|---|
| Certification (BIS or third party – accredited test agency) for compliance to be provided to the procurement agency. | | |
| **B. Product Noise** | | |
| Not necessarily included as a part of conventional tenders. | Air conditioner shall conform to the noise levels as specified under the standard issued by BIS (IS 1391 Revised).<br>Verification Instrument:<br>Certification or report (third party – accredited test agency) for compliance to be provided to the procuring agency | |
| **C. Energy Consumption**<br>The information on ISEER of room air conditioners (RACs) is available in the public domain through the BEE's portal. Products with higher ISEER, than prescribed by BEE 5-star are also listed. Therefore, depending upon the requirement, the comprehensive criteria shall be defined in a way only the best available technologies (in terms of ISEER) within the 5-star RAC models are selected.<br>*For example:*<br>*At present, the minimum qualification for 5 stars is ISEER 4.5 (variable capacity RAC). However, there are products available in the market with ISEER of 6.15 (1 TR), 5.6 (1.5 TR). There are 400 models registered under the BEE's database of 5-star labelled variable speed air conditioners. At least 75 models from 12 brands registered, have an ISEER of 5 and above.* | | |
| GeM recommends the purchase of star labelled air conditioners, however, it doesn't specify the preferred star level for procurement. | The ISEER shall be not less than the value prescribed for a 5-star level as per norms specified by the Bureau of Energy Efficiency (BEE) from time to time.<br>Verification Instrument:<br>Approval letter from BEE for the qualification of the 5-star band and respective ISEER value. | The ISEER shall be at least 25% higher than that prescribed for a 5-star level as per norms specified by the Bureau of Energy Efficiency from time to time.<br>Verification Instrument:<br>Approval letter from BEE for the qualification of the 5-star band and respective ISEER value |
| **D. Refrigerants** | | |
| GeM allows for manufacturers to specify if the air-conditioner has an eco-friendly refrigerant, but this is not a mandatory criterion and it is at the discretion of the procurement agency. | Refrigerants which are ozone-depleting and higher GWP as identified under the Montreal Protocol and/or Kigali protocol shall not be used in the manufacture or import of these RACs.<br>The refrigerant should have Zero ODP. The Global warming potential (GWP) not exceeding | |

| Conventional Criteria | Core Criteria | Comprehensive Criteria |
|---|---|---|
| | 700 (100 years)[16] is recommended until a specific directive is issued by MoEFCC.<br>Verification Instrument:<br>Certification (self or third party) for compliance to be provided to the procuring agency.<br>Alternatively, manufacturer's declaration conforming the information provided is as per BIS Standard on the RAC's rating plate shall be provided. | |
| **E. Recycled plastic components** | | |
| | | The product shall be designed to promote recycling, by utilizing recycled plastic components at least 80% percent by weight of plastic components in the product.<br>Verification Instrument:<br>Certification (self or third party) for compliance and a self-declaration from the manufacturer to be provided to the procuring agency. |
| **F. Paint** | | |
| | | Paints used in the product shall not contain heavy metals or their compounds include mercury (Hg), lead (Pb), cadmium (Cd) and hexavalent chromium (Cr).<br>Verification Instrument:<br>Certification (self or third party) for compliance to be provided to the procuring agency |
| **G. Packaging** | | |
| | | The air conditioner shall be packed in such packages, which are made of recycled or biodegradable materials. |

[16] The GWP value is as per U4E AC Model Regulation Guidelines from UNEP and the EU criteria. The value considers allowable refrigerants as per IPCC Fifth Assessment Report, 2014. The EU market has a ban for GWP 750. The recommended criteria have been kept more ambitious in terms of allowable GWP value for refrigerants controlled under the Montreal Protocol. Also, in the recent market intervention initiative by EESL for launch of 7-star air conditioners, similar limit for allowable refrigerant has been considered.

| Conventional Criteria | Core Criteria | Comprehensive Criteria |
|---|---|---|
| | | Plastic packaging shall not contain halogenated hydrocarbon.<br>Or, the Plastic packaging shall conform to testing requirements specified in the BIS draft on ECO criteria.<br><br>Verification Instrument:<br>Certification (self or third party) for compliance to be provided to the procuring agency. |

### 5.4.3 Selection of bid companies

Within the GeM framework, there isn't a specific process for the selection of bid companies. It is included within the tendering stage. The tendering stage is a comprehensive stage for the qualification of bid companies and products based on technical specifications.

**Table 11: Criteria for selection of bid companies**

| Conventional Criteria | Core Criteria | Comprehensive Criteria |
|---|---|---|
| **A. Organizational Criteria** | | |
| Organizational criteria include compliance requirements or certifications to be met by the product manufacturers and/or suppliers at an organization level. | | |
| **A1. Hazardous substance management**<br>Information on Rules is available on the MoEFCC website. The Acts and Rules made thereunder shall be read including all amendments to date. | | |
| | • The Environment (Protection) Rules,<br>• Hazardous Waste (Management, Handling & Transboundary Movement) Rules,<br>• E-Waste (Management) Amendment Rules,<br>• Plastic Waste (Management and Handling) Rules,<br>• Solid Waste (Management) Rules<br>• The Plastics (Manufacture, Usage and Waste Management) Rules<br>• The Recycled Plastics Manufacture and Usage Rules,<br>• Batteries (Management and Handling) Rules<br>• The Manufacture, Storage and Import of Hazardous Chemical Rules.<br>Verification Instrument:<br>The manufacturers shall produce necessary documentation for | |

| Conventional Criteria | Core Criteria | Comprehensive Criteria |
|---|---|---|
| | compliance with requirements of these Rules to the procuring agency.<br>The documentation process already in-exercise by the manufacturers for conforming to the compliance with these regulations and/or as per the business-as-usual conditions shall be submitted. | |
| **A2. Noise Pollution** | | |
| | The manufacturing facilities shall comply with the noise standards for industrial facilities, as specified within the provisions of the Act and Noise pollution (Regulation and Control) Rules. Additionally, all such facilities should take measures for the abatement of noise, including noise emanating from the sound producing equipment or instruments, and should ensure that existing noise levels do not exceed ambient air quality standards specified.<br>All planned developmental activity related to industrial manufacturing or distribution of manufactured products should take into consideration noise pollution aspects and should avoid noise menace.<br>The recommended ambient noise levels shall always be adhered to by cooling appliance manufacturing facilities.<br><u>Verification Instrument:</u><br>Certification (self or third party) for compliance to be provided to the procuring agency | |
| **A3. Ozone Depletion**<br>The complete list of ozone-depleting substances is specified on the website of the Ministry of Environment, Forests, and Climate Change (MoEFCC), and includes CFCs, Halons, Carbon Tetrachloride, Methyl Chloroform, HCFCs, BFCs, HBFCs, and Methyl Bromide. | | |
| | No manufacturing facility shall employ equipment that releases ozone-depleting substances, and all existing equipment should be in the process of phasing out ozone-depleting substances.<br>No manufacturing facility shall export or import ozone-depleting substances, | |

| Conventional Criteria | Core Criteria | Comprehensive Criteria |
|---|---|---|
| | equipment, or instruments to any country.<br>No manufacturing facility or any associated person(s), shall sell, stock, or exhibit for local or international sales, any ozone-depleting substance, equipment, or instrument.<br>No manufacturing facility or any associated person(s), shall establish, expand, or invest in, ozone-depleting substances, equipment, or instruments.<br>Verification Instrument:<br>Certification (self or third party) for compliance to be provided to the procuring agency | |
| **A4. Environmental Management System (EMS) Certification** | | |
| | | Compliance with ISO 14001 (EMS – Environmental Management System)<br>Verification Instrument:<br>Third-party certification to be provided to the procuring agency |
| **A5. Corporate Social Responsibility** | | |
| | | Comply with Corporate Social Responsibility Norms as per the Rules and Provisions under the Company Act and revised from time to time.<br>Verification Instrument:<br>Certification (self or third party) for compliance to be provided to the procuring agency |
| **B. Social Criteria** | | |
| Social criteria include compliance of acts, policies, programs or rules followed by product manufacturers towards its employee wellbeing. It refers to relationships with employees, suppliers, customers, and communities. This would also be adherence at the organization level. | | |
| **B1. Labour Laws** | | |
| | Comply with the Indian Labour Law (for establishments in India) or International Labour Organization (for international establishments), as specified within the provisions of the various Rules and Regulations prepared from time to time.<br>Verification Instrument: | |

| Conventional Criteria | Core Criteria | Comprehensive Criteria |
|---|---|---|
| | Certification (self or third party) for compliance to be provided to the procuring agency | |
| **B2. Employee Well-being and Gender Inclusivity** | | |
| | | Should have internal policies and guidelines to promote employee and staff wellbeing.<br>Verification Instrument: Self-declaration |

#### 5.4.3.1 Seller Rating

GeM has a strong vendor rating system that enables the reward of good performance to sellers by giving them the opportunity for more business. This also encourages sellers to improve upon their ratings by focusing on specific areas. The existing parameters for the seller rating on the GeM portal are

- Coverage
- Timely Delivery
- Quality of Order Fulfillment
- Reliability

Besides the above existing parameters, additional parameters based on sustainability consideration (organizational and social criteria) can be considered to provide ratings to sellers.

### 5.4.4 Award of contract

The guidelines for evaluation shall be as defined in the General Financial Rules (GFR) revised from time to time by the Department of Expenditure, Ministry of Finance, Government of India.

**Table 12: Criteria for award of contract**

| Conventional Criteria | Core Criteria | Comprehensive Criteria |
|---|---|---|
| Multiple procurement options as per GeM are below:<br>a) Direct Purchase - For amounts Less than INR 25,000.<br>b) L1 – For an amount between INR 25,000 and INR 500,000, procurement based on the least cost.<br>c) Bid /Reverse Auction (RA) - Procurement via Bid/RA to get the best price quote bid to RA option is also available after evaluation in bid.<br>d) The intent of Buying PAC - Procurement of specific products as per requirement is also possible. | All shortlisted room air conditioners should meet all of the technical specifications outlined in the core criteria under "Defining Specifications".<br>All manufacturers shortlisted meet the core criteria under "Selection of bidding companies".<br><br>Once both the above criteria are met, the room air conditioner with the lowest acquisition price can be selected for the procurement. | All shortlisted room air conditioners should meet all of the technical specifications outlined in the core criteria under "Defining Specifications".<br>All manufacturers shortlisted meet the core criteria under "Selection of bidding companies".<br><br>The product is shortlisted based on the total cost of ownership (TCO).<br><br>This method considers the cost of the room air conditioner over its possession time. In this case, the information/assumptions for operating, maintenance and end of |

| | | |
|---|---|---|
| e) The intent of Buying Bid - If the objective is to go for bid (only bid) – there is no need for comparison.<br><br>**All of the above consider the procurement of products with the least acquisition cost.** | Verification Instrument:<br>No additional requirement. | life-related cost shall be defined by the procurement agency in advance.<br><br>Verification Instrument<br>Supporting data for the calculation of the total cost of ownership shall be provided by the manufacturers of the room air conditioner (bidders). |

### 5.4.5 Contract Clauses & Management & Monitoring

The clauses outlined below are in addition to the conventional clauses that form a part of the complete contract document set.

Further, the management and monitoring requirements will be based on the need and requirements of the procurement agency. Criteria for the development of contract clauses, monitoring, and management post-installation require further assessment and discussion with stakeholders.

**Table 13: Criteria for contract clauses**

| Conventional Criteria | Core Criteria | Comprehensive Criteria |
|---|---|---|
| **A. Safe Disposal**<br>It is preferred that instead of defining the end of life costs, the procuring agencies consider incorporating the "take back clause" in the contract. Annex 6 includes information on some tenders where such clause has already been implemented and thus is step forward towards safe disposal. There are various registered dismantlers /recyclers across the country and hence the availability of facilities to ensure safe disposal is not an issue. A brief list of registered dismantlers /recyclers across the country has also been provided in the Annex 7. | | |
| Within the GeM framework, this may not be a part of standard tender specifications. | The inclusion of "buy-back" or "take back clause" in the contract is recommended for all types of contracts. This also includes contracts where previously installed air-conditioners need to be replaced.<br>Verification Instrument:<br>The tender submission that indicates this clause. | Include the true cost of end of life strategy.<br><br>Verification Instrument:<br>Life cycle assessment that indicates the end of life impacts and costs. |

## 5.5 Recommended Evaluation for RACs based on Life cycle Assessment

Currently, the sustainable public procurement framework recommends the selection of room air conditioners based on technical specifications (ISEER and GWP) and/or the total cost of ownership. Both give a particular importance to the use phase of the room air conditioner, which has been considered to have the highest environmental impact. In a mature market, these technical

specifications may be replaced by life cycle-based assessment evaluation. There are two ways to evaluate room air conditions based on boundary conditions for life cycle assessment.

a) Method 1 is evaluating the products based on direct emissions due to refrigerant.
b) Method 2 is based on Life Cycle Climate Performance (LCCP). In this method, detailed information on direct and indirect emissions will be required. This is the recommended method for evaluation for SPP.

### 5.5.1 Method 1: Evaluating the products based on refrigerant (direct emissions)

Method 1 represents the present situation in which the procuring agency does not need to get into a detailed calculation of LCCP. The room air conditioners can be listed in the order of GWP values from low to high. The procurement agency can define a weighted criterion for the selection of room air conditioners which have very low GWP value.

### 5.5.2 Method 2: Based on the detailed calculation of Life Cycle Climate Performance (LCCP)

A typical method of evaluating the Life Cycle Assessment (LCA) is to assess Life Cycle Climate Performance. LCCP for a product serves as a holistic measure of the emissions throughout the life of a product. It gives an accurate evaluation of the global warming impact of different products.

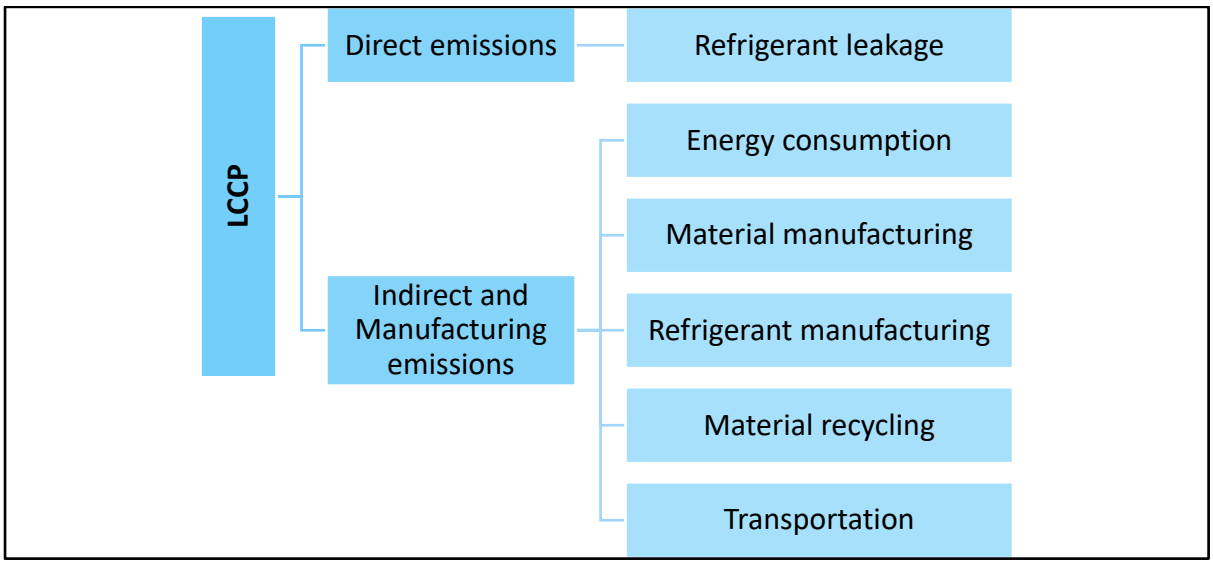


**Figure 10: Life Cycle Climate Performance (LCCP) for Room Air Conditioner**

Here,

$$\mathbf{LCCP = TEWI + Manufacturing\ Emissions}$$

TEWI = Total Equivalent Warming Impact, GWP
TEWI = GWP (direct emissions, refrigerant leaks including end of life) + GWP (indirect emissions, operations)
Direct emissions, GWP = chemical refrigerant emissions, manufacturing leakage, and end-of-life
Manufacturing emissions, GWP = energy consumption (in CO2 equivalents), emissions from chemical production, manufacturing of components, assembly, transportation, and end-of-life.

Therefore,

$$\mathbf{TEWI = (GWP \ X \ M \ X \ L \ X \ N) + (GWP \ X \ M \ X \ (1 - \alpha_{recovery}) + (E \ X \ \beta \ X \ N)}$$

Where,

GWP = GWP of refrigerant relative to $CO_2$
L = Annual leak rate in system, %
N = Life of system, years
M = Refrigerant charge, kg
$\alpha_{recovery}$ = recovery over recycling factor from 0 to 1
E = Annual Energy Consumption, kWh/year
β = indirect emission factor, kg $CO_2$ per kWh

The manufacturing emissions are small in proportion and hence, LCCP = TEWI can be considered. The values of respective heads under direct, indirect and manufacturing emissions shall be obtained from the manufacturer, based on third-party certification.

At present, the requisite details for LCCP are not being provided by the manufacturer to any agency. Hence, it is not clear whether all manufacturers will be able to submit these details to the procurement agency. Furthermore, there is a need to define a specific format in which these details shall be requested for evaluating bids. Even though it is the preferred method, the industry may require some time to provide the data. Therefore, method 2 requires a roadmap with specific timelines for its inclusion in the procurement procedure in the future.

### 5.5.3 Cooling as a service

This method considers shifting from purchasing air conditioners as a product to air conditioners as a service. The focus here is to promote product design considering overall life /operations to enhance the durability and life of the product and ensuring easy reparability.

One of the ways could be considering performance-based contracting like ESCO /RESCO contracts. The installation of air conditioners could be based on a fixed rental method and evaluation criteria could be monthly electricity consumption for example like chiller systems. This is a futuristic scenario that requires deliberations between stakeholders to understand the procurement agency's perspective towards possible payment and contracting methods as well as manufacturers /supplier's perspectives towards providing services and not only the product.

## 5.6 Cost Consideration

The total cost of ownership (TCO) is recommended as an evaluating methodology for comparing room air conditioners. This considers the cost of a room air conditioner over its possession time. The data for calculation shall be provided by the manufacturers of the room air conditioner (bidders). Also, the information/assumptions for operating, maintenance and end of life-related costs shall be defined by the procurement agency in advance.

The total cost of ownership (TCO) considers the cost of a product over its life cycle instead of the initial cost. It also incorporates the product's energy consumption performance in its calculations.

An illustrative representation of the same is shared below:

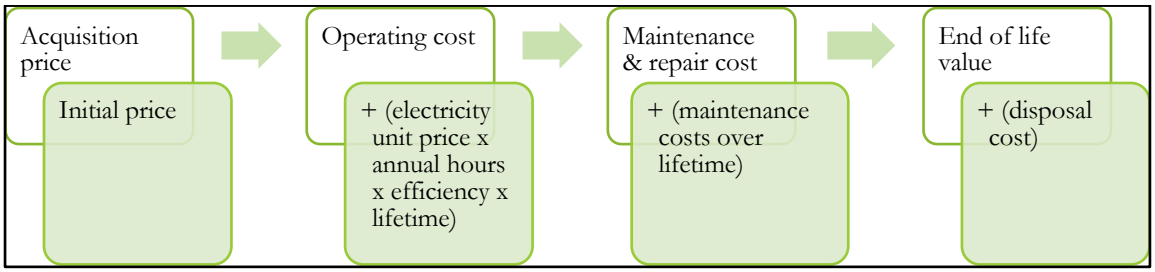


**Figure 11: Methodology for Total Cost of Ownership analysis**

At present, the requisite details for the total cost of ownership is not a standard practice of submission by the manufacturer to any agency. Also, there is no standardized method or assumptions defined for calculation of operating, maintenance, and end of life costs. Therefore, this will need a thorough discussion between relevant stakeholders (manufacturers and central procuring agencies as well as standard making bodies) to deliberate and define a roadmap for its inclusion in the procurement procedure.

A sample comparison of the total cost of ownership (TCO) between a 3-star label and 5-star label split air conditioner has been provided in the table below based on certain assumptions.

**Table 14: Sample comparison of the total cost of ownership (TCO)[17]**

| Room Air conditioner | Acquisition price (INR) | Annual Electricity Consumption (kWh/ year) | Annual Cost of Electricity (INR) | Total Cost of Ownership (INR) | Payback (Years) of incremental cost on 3-star |
|---|---|---|---|---|---|
| 3 Star (3.5) | 34,600 | 1,125 | 11,250 | 147,100 | - |
| 5 Star (4.5 ISEER) | 41,200 | 880 | 8,800 | 129,200 | 2.7 years |
| Super-Efficient AC (5.2 ISEER) | 50,000 | 780 | 7,800 | 128,000 | 4 years |

Based on certain conditions of use, hypotheses (e.g. life of 10 years) and method (not considering maintenance, inflated costs of electricity in the future, and disposal), it can be inferred that the payback of a 5-star air conditioner over a 3-star is less than three years. Further, the environmental impact due to energy use during the life cycle use phase of a 5-star air conditioner will be much lesser than that of a 3-star air conditioner when considering reduced GHG emissions equal better air quality.

[17] Assumptions:
The calculations are done for a room air conditioner (split, variable speed) of 1.5 TR.
The initial cost is an approximate average based on study of products available in the market.
This assessment has been done for Variable speed room air-conditioner.
The annual electricity consumption is based on a study of the range of the products listed on the BEE website.
The tariff is considered as INR 10 /unit cost of electricity. The annual cost will vary based on electricity tariff structure in different cities as well as climatic conditions.
The total cost of ownership is based on service life of 10 years.

### 5.6.1 Implications for the recommended criteria set

A summary of some of the significant newly recommended SPP criteria is provided below.

**Table 15: Implications of the newly recommended SPP criteria**

| Newly recommended SPP criteria | Difference between green and non-green product |
|---|---|
| Type of air conditioner – Fixed speed air conditioners are recommended to be discontinued. | Inefficient air conditioning products are recommended to be not included in the list. The total cost of ownership of energy-efficient products is less when compared with inefficient products. |
| Energy Efficiency criteria for room air conditioners. | Lower environmental impact, during the use phase. The total cost of ownership of products with higher ISEER is less when compared with products with lower ISEER. |
| Criteria for refrigerant (GWP) has been specified. | Lower environmental impact throughout the entire life cycle of the product, including end of life disposal. |
| Recycled plastic in components | Less burden on the use of virgin material in manufacturing and reduced environmental impact at the end-of-life stage due to safe disposal. |
| Sustainable packaging criteria | Less burden on the use of virgin material. |
| "Take back" or "buy back" with safe disposal included in the contract clauses. | Less burden on the use of virgin material. It can ensure recycling, safe disposal of refrigerant, thereby leading to lower environmental impact. |

## 5.7 Market Readiness Analysis

While the vision is to ensure that the criteria outlined earlier are met, it may not be possible to do so on day zero. This may be due to various reasons – availability of products, consumer awareness of sustainable alternatives, affordability, etc. Hence, to ensure the successful implementation of sustainable public procurement strategy, it was necessary to assess the market readiness in terms of supply and demand for a sustainable product. Secondary research was carried out. The following section is a summary of the study for room air conditioners that meet the criteria outlined in the previous section.

The overall sustainable public procurement criteria for room air-conditioners shall be finalized based on discussions and feedback from stakeholders, including the Ministry. Phase wise implementation of the sustainable public procurement framework would help towards transforming the market towards sustainable alternatives.

### 5.7.1 Market readiness analysis: supply

The air-conditioning market in India has been growing fast, at an average rate of 18-20% over the last decade.[18] In 2017, the room air conditioner (RAC) market size was 7.6 million.

Approximately 8% of the current households have room air conditioners. This is anticipated to rise to 21% and 40% in 2027-28 and 2037-38 respectively. The aggregated nationwide cooling demand, in Tonnage of Refrigeration (TR), is projected to grow around 8 times by 2037-38 as compared to the 2017-18 baseline. The building sector cooling demand shows the most significant growth at nearly

[18]Business Standard – "Consumers switch to inverter ACs as energy efficiency gains ground"; September 2013

11 times as compared to the baseline. The overall projected cooling growth leads to a 5 to 8 times increase in the aggregated refrigerant demand by the year 2037- 38. Room air conditioning units with cooling capacity up to 7 kW make up more than 80% of sales in India.[19]

The market includes window ACs, high wall splits, floor and ceiling mounted units, inverter ACs, and packaged units. In the financial year 2017, the annual sales of split type RACs was 87%, window type RACs was 12%, whereas cassette and floor standing type RACs comprised 1% of the market share in terms of annual sales. In the same year, fixed speed air conditioner comprised 70% of the market sales and variable speed air conditioners were 30%.

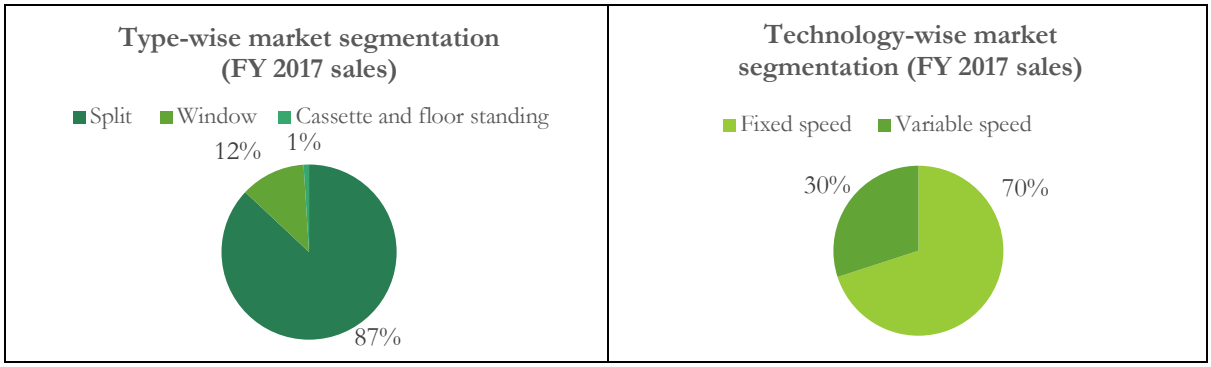


**Figure 12: RAC market segmentation**

According to United 4Efficiency Air Conditioner Guidelines, in India, there is a potential of USD 17 billion financial savings cumulatively for consumers through 2030 by improving RAC energy efficiency policies.

According to research by the Indian Society of Heating, Refrigerating & Air-conditioning Engineer (ISHRAE)[20], Indian consumers are increasingly opting for energy-efficient products and products with a lower environmental footprint. BEE's Star Labeling program has increasingly gained popularity over the years, and ISHRAE states that there has been a shift in consumer preference from one and two-star models to three and four-star models.

Sales of energy-efficient air conditioners i.e. the product with BEE's 5-star label has increased. Based on annual sales in the financial year 2017, the market share of BEE 5 star labeled air-conditioners was 18%, 4-star labeled air conditioner was 3% and 3-star labeled air conditioner was 66%. 87% market sales of the financial year 2017 comprise air conditioner with BEE's 3-star label and above.

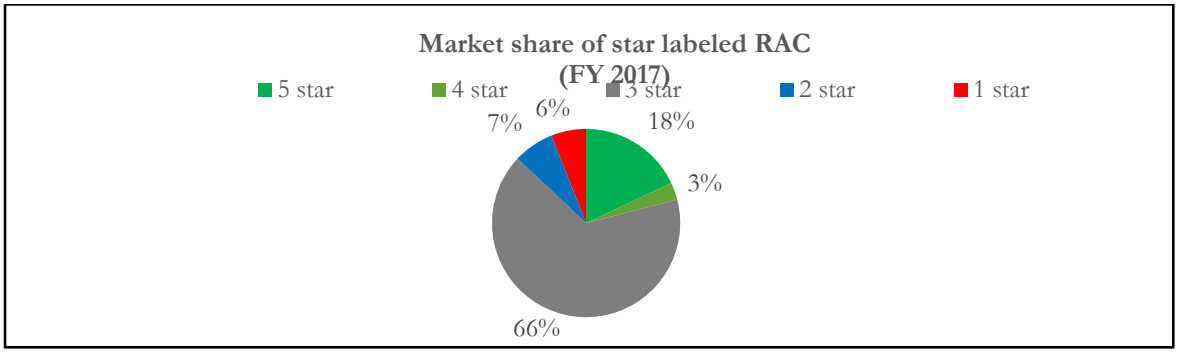


**Figure 13: Market share of star labelled RAC**

[19] India Cooling Action plan, March 2019, Ozone Cell.
[20] ISHRAE – Air Conditioner Market in India; September 2015

### 5.7.2 International market scenario

The air-conditioning industry is widespread, with both national and global manufacturers. Air-conditioners are manufactured based on internationally accepted test standards. Hence, air conditioners manufactured in various economies are available for international trade because they comply with regulations and requirements defined by governments in many countries.

Further, the sustainable procurement product criteria have been defined for air-conditioners by many international economies such as Thailand, South Korea, Hongkong, and EU countries. Some of these countries are major manufacturing hubs; such as Thailand.

### 5.7.3 Market share of room air conditioners conforming to product criteria

The market share of room air conditioners equivalent to BEE 5-star label has been assessed in this section. Room air conditioners meeting the highest star rating criteria are available in the market. The following facts support this statement.

a) Room air conditioners are mandated to be BEE star labelled. The 5-star labelled energy-efficient RACs are expected to have a market share of about 20% in terms of annual sales volume.
b) Based on the historical data, the weighted average ISEER (Indian Seasonal Energy Efficiency Ratio) has increased from 2.80 in FY 2011 to 3.70 in FY 2017. Furthermore, in the last few years, the energy efficiency requirement for ACs has been ratcheted-up in two phases. Going forward, it is expected that BEE will revise the energy efficiency band further and therefore the market will shift towards more energy-efficient products.
**c)** The minimum ISEER required for 5star variable-capacity air conditioner is 4.5. As per the BEE's database of registered 5-star labelled variable speed ACs, there are approximately 481[21] models registered under different brands. Among these, **73 models from 17 brands registered, have an ISEER of 5 and above.**

The data of air conditioners available in the market along with information on their energy efficiency label details can be referred from the BEE star label website.[22] The annex include a list of super-efficient room air conditioners (ISSER>5) (variable speed) as listed on the BEE website.

### 5.7.4 The extent of local production

Majority of the brands have local manufacturing facilities in India. The air conditioner manufacturers are mostly global players with facilities in many countries and therefore depending upon the product model design, the manufacturers decide whether it is to be manufactured locally in India or to be imported from any of their facilities in other countries. The Local content when determined on cost basis, ranges between 25-33%. Most RAC manufacturers are importing AC parts. Manufacturers that are manufacturing inhouse controllers (such as LG, Daikin) may have approximately 33% local content (by cost), whereas those that do not currently manufacture high-cost components in India (such as Voltas) may have approximately 25% local content. Some manufacturers (such as Godrej) have part production of components in India and hence the range for their models is 26-33%.

[21] As of October 2021 as per the information provided by BEE.
[22] http://www.beestarlabel.com/SearchCompare

It is important to note that despite RAC imports, these are undertaken by suppliers registered in India. The brands/manufacturers import the air conditioner and sell it through their supply chain network.

### 5.7.5 Market readiness to meet future demands (Short, medium and long term)

The air conditioner manufacturers are international players and have the experience of complying with the regulations of eco-labeling and sustainable procurement in other countries. Depending upon the stakeholders' views towards sustainable procurement criteria for RACs, it is expected that the manufacturers would be able to comply with the same and the products would be available for consumption.

### 5.7.6 SMEs /Large enterprises involved in the fabrication/import of RACs.

In the case of air conditioners, the data on SMEs is not available. It is expected that the majority of the market is captured by large enterprises. There are 74 brands registered with BEE. The list is available in the BEE's product search and compare portal. (http://beestarlabel.com/SearchCompare).

### 5.7.7 Impact of the import of the prioritized goods on local producers

Since most imports are being done by the registered large enterprises in India from mostly their facilities in other countries, therefore, the risk of suppression due to imports is not applicable. However, it would be important to record the views from industry association in this regard.

### 5.7.8 Price analysis

An illustrative representation of some of the air conditioner models is provided here. There are two broad categories: Conventional RAC and energy efficient RACs (with the highest performance rating available as of August 2019).

**Case example:** 1.5 TR split type air conditioner (based on product models offered by 9-10 major manufacturers/suppliers)

a) The average price for a conventional 3-star split type AC of fixed speed in India: INR 34,620
b) The average price for an energy-efficient 5-star split type AC of variable speed in India: INR 41,200

The Indian market is quite competitive. Hence, the average price in India is likely to be comparable and/or less than prices in other major countries; with similar conditions w.r.t to availability of local manufacturers and market demand.

### 5.7.9 Existence of environmental management systems and/or other sustainability credentials

Supporting data is not available to respond to this section. However, the manufacturers in India are expected to have conformance with ISO 14001, since the same is also exporting the products in the international market. Some of the countries have already defined compliance with environmental management systems as a pre-requisite. And hence it can be assumed that AC manufacturers/ suppliers would have the environmental management systems in place.

#### 5.7.9.1 Prospects for export markets

Indian manufacturers are already exporting air conditioners. Based on secondary market research, the annual exports from India for room air conditioners are approximately 0.15 million[23].

## 5.8 Market readiness analysis: Demand

This section summarizes the demand for room air conditioners that meet the product criteria in the Indian market.

### 5.8.1 Evolution of the national and international demand for targeted products and services with a specific focus on public procurement demand

An analysis of public procurement for air conditioners has been done to understand the existing demand scenario. Annex 6 provides a summary of some of the public tenders initiated in the last 2 to 3 years for the procurement of air conditioners. Some of the key takeaways from the analysis of tenders are as follows:

1. The procurement of variable speed air conditioners is being preferred.
2. Eco-friendly refrigerant is being defined as a key requirement however there is still a scope of defining only low GWP refrigerants going forward.
3. Noise qualifications have been initiated. It has been incorporated as a minimum requirement specifically for window type air conditioners in one of the tenders. This shows that the industry must have aligned their products as per global standards on noise levels.
4. Some of the procuring agencies have considered the buy-back options while purchasing the air conditioners which shall ensure safe disposal of used products.
5. Mostly the prevailing BEE 5-star requirement is mentioned as minimum criteria but, in some cases, the 3-star air conditioners were also allowed.

In sum, the tender documents show that the procurement of energy-efficient air conditioners is being preferred. In the absence of central common guidelines, the public agencies have mentioned their technical specifications which to some extents are focused on purchasing an energy-efficient product. The increase in weighted average ISEER from 2.80 in FY 2011 to 3.70 in FY 2017 shows the rise in demand for energy-efficient air conditioners.

The mass awareness and outreach initiatives by the Government of India through their various platforms such as the MoP, the BEE, etc. from time to time, have helped consumers in being more aware of most energy-efficient technology(s) and products available in the market. Further, society, in general, is becoming informed of the need for their contribution to environmental sustainability.

Going forward, there is a huge growth potential for air conditioners in the Indian market with an expected CAGR of 18%. The demand of energy efficient air conditioners will likely rise. Sustainable public procurement policies will surely support the uptake of the most efficient air conditioners in the market. Considering the Annual Maintenance Cost (AMC) for high efficiency ACs, it is approximately 5-6% of the product cost and is dependent on manufacturer and tender requirements. Efficiency of product does not have bearing on AMC.

### 5.8.2 Overview of the national programs, policies, and instruments

Several initiatives are being taken in the country to promote energy-efficient air conditioners as well as to ensure its low environmental impact manufacturing. The Indian Cooling Action Plan (ICAP) lists

[23] Reference: Euromonitor research February 2019 – Air Treatment Products in India

the need for introducing eco-labeling criteria for cooling products. The draft eco-labeling criteria for room air conditioners have been introduced by BIS in the draft IS and is presently under review.

Some of the national programs, policies, and instruments on room air-conditioners have been elaborated below:

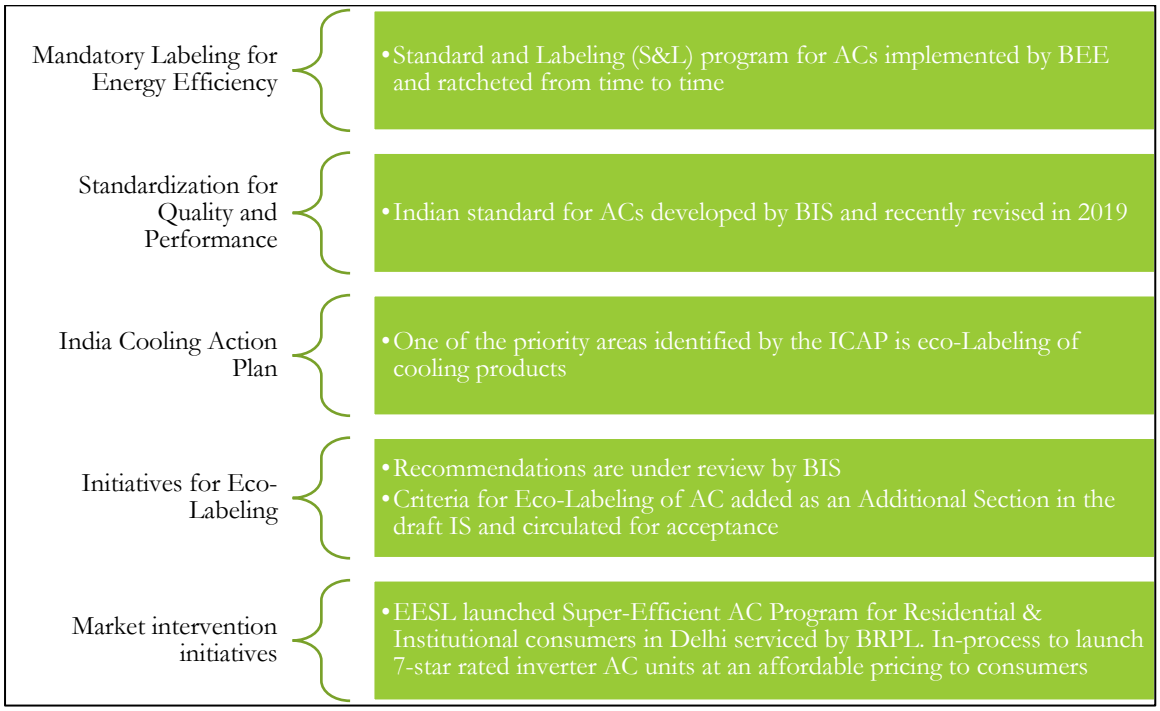


**Figure 14: SPP National Programs, Policies, and Instruments Overview**

# 7 Conclusion

Public procurement is seen to advance sustainable development directly, with increased competitiveness and innovation being spin-offs. Since the term 'sustainable' considers economic and social considerations, also, implementation of sustainable public procurement will help direct engagement with SDG targets, small and medium enterprises, local communities, disadvantaged groups, etc.

In the present study, the suggested prioritized product categories were paper, disinfecting/cleaning solutions and room air-conditioners, based partially on demand figures and the availability of criteria for determining/defining an environmentally friendly product; however, the move towards a finalization of product categories for sustainable public procurement in India could build upon the product categories studied here, by:

1. a detailed market analysis including quantification of public demand and production capacities for the product: this information could not be gathered in the time available.
2. developing certifications/labels to identify standard sustainable alternatives: this is a long-term exercise but can be initiated alongside by the appropriate agencies/ministries for relatively easy products.

The UNEP SPP approach shown in Figure 1 of this report shows the steps that can be followed, but where criteria are already identified and alternatives available, SPP can be implemented in a relatively straightforward manner through inclusions in the GeM specifications.

The results of a preliminary market assessment for these suggests that the market in terms of supply is well-developed for room air-conditioners and paper of the writing/printing grade. Mandating certain conditions for public procurement can encourage and drive production of sustainably produced products.

For procurement of paper sustainable harvesting of wood from plantations might be considered a basic sustainability requirement. Raising plantations also serves local farmer communities. FSC-certified manufacturing units operate in India, but it was not possible to estimate the supply available vis-à-vis demand from the public sector. All writing and printing paper procured could have:

- Procurement of writing and printing paper that is FSC or NCCF certified; or
- Procurement of Eco-Mark paper

Based on the Indian market readiness analysis, it is recommended that authorities select room air-conditioners that at least meet specifications outlined under core criteria. Variable-capacity room air conditioners, with minimum ISEER as per the 5-star level of Bureau of Energy Efficiency (BEE), considering evaluation based on the total cost of ownership (TCO) for products with higher efficiencies have been recommended. The energy efficiency threshold can be periodically evaluated based on global and Indian market assessments.

Further, refrigerants with zero ozone depletion potential (ODP) and a global warming potential (GWP) of less than 700 (100 years)[6] is recommended. This value can also be periodically evaluated.

To reduce the burden on the use of virgin materials, recycled plastic component to be at least 80% by weight of total plastic components in the product. Further, contract documents should include a “buy-back” or “take-back” clause along with provision for recycling and safe disposal.

The evaluation of room air conditioner based on the total cost of ownership which includes, initial cost, cost of operation through its use phase, cost of maintenance and end-of-life disposal would help the procurement agency select products that have an overall lower impact on the environment.

# Annex 1: Minutes of consultation

**By Email Only**

No.F.20/8/2019-PPD
Government of India
Ministry of Finance
Department of Expenditure
Public Procurement Division
*****

512, Lok Nayak Bhawan,
New Delhi Dated 12th June, 2019.

**OFFICE MEMORANDUM**

**Subject : Minutes of Meeting for Sustainable Public Procurement (SPP) Review meeting held on 10.06.2019**

The undersigned is directed to forward minutes of the meeting held on 10.06.2019 in the chamber of Joint Secretary (PF C-II), Department of Expenditure regarding the above cited subject.

2. This issues with the approval of Joint Secretary (PF C-II).

(K Narayana Reddy)
Deputy Secretary to the Govt. of India
Telfax:-24621305
Email:-kn.reddy@gov.in

To

(As per list at Annexure 'A')

**Minutes of the meeting held on 10.06.2019 in the chamber of Joint Secretary (PFC-II), Department of Expenditure (DoE), Ministry of Finance (MoF), North Block, New Delhi.**

The list of participants is attached at Annexure-A. It was noted that no representative from MoEFCC had come for the meeting.

2. At the outset of the meeting, Joint Secretary (JS) (PFC-II), DoE, MoF welcomed the participants for the meeting. It was stated that the agenda for the meeting is to get the update on the prioritization study being done by The Energy and Resources Institute (TERI) and CII ITC Centre of Excellence for Sustainable Development for identification etc. of priority products for Sustainable Public Procurement (SPP).

3. Director, DoE, MoF giving a background informed that DoE constituted a Task Force on Sustainable Public Procurement in April, 2018 to prepare an Action Plan for SPP. The members of the Task Force include Ministry of Environment, Forest and Climate Change (MoEFCC), Ministry of Railways (MoR), Government e-Marketplace (GeM), Bureau of Indian Standards (BIS), Bureau of Energy Efficiency (BEE). On the recommendations of United Nations Environmental Program (UNEP), MoF has approved Terms of Reference for conducting for this prioritization study. For this purpose, UNEP provided funds to TERI to conduct the study. TERI in turn has selected CII ITC Centre of Excellence for Sustainable Development (CICESD) to carry out the prioritization study. While approving ToRs for the prioritization study, it was stipulated by MoF that monthly progress review will also be done. The present meeting is first such review. Thereafter, CICESD was requested to present the update on the prioritization study.

4(i). CICESD informed that a long list of ten product categories was prepared (Annexure-B). The ten product categories in some cases are further divided in to specific product(s), for example for the product category "Office IT equipment" the products mentioned are "Printer/ Copier", "Desktop", "Laptop", "Monitor" and "Tablet". While preparing the long list, potential product categories identified by the Task Force on Sustainable Public Procurement were also considered.

ii) CICESD stated that while preparing long list of product categories, they have tried to stick to the methodology specified by UNEP, however in place of ranking the products, they have given qualitative indicators like "L for Low", "M for Medium" and "H for High". These qualitative indicators are then assigned to attributes like "Value", "Volume", "Environmental Impact", "Social Impact". Further, CII attempted to prepare the list of Eco-label/ certification for the long list of product categories across their life cycle. The life cycle starts from Extraction and Manufacturing (E&M), In Use and End of Life (EOL). It was noted that for majority of the products, no such information is available. For EOL management, Hazardous Waste Management Rules issued by

(2)

MoEFCC are existing. For product category named Medical Devices, the EOL management is governed by Bio-Medical Waste Rules, also issued by MoEFCC.

iii) Data from GeM was also collected for the study by CICESD. For some thirty products including printers, paper etc. information on volume in terms of number of tenders (see Annexure-C) and value in Rs. Crore (see Annexure-D) was taken from GeM. The question arose on how to pick the three products for SPP implementation. TERI suggested that paper may be taken as the low hanging fruit along with cleaning chemicals (Disinfectants). Attributes for paper in terms of both value and volume are high and there are already existing BIS standards. Disinfectants are used in high volume and have high environmental impact and medium social impact. CICESD and UNEP both suggested that medical devices may also be considered. Medical devices have considerable environmental and social impact, have high volume however are of low value. Medical device mentioned in Annexure-B related to PVC gloves. Another product category could be public works with Cement, Steel and Bricks as the products, furniture or mobile phones.

5. DoE stated that the study being done by CICESD shall act as the standalone exercise and the product category suggested during the meetings of Task Force shall not be taken as the basis as Task Force is not meant to influence the present study on product prioritization. The outcomes of the study shall be having an independent point of view and may or may not be related to the product category suggested by Task Force during the deliberations.

6. DoE also stated that Paper and Disinfectants may be considered for SPP implementation as being recommended. However, PVC gloves may not be taken as these have a niche market and may not have the desired demonstration effect. Regarding public works, discussion with Central Public Works Department (CPWD), NBCC etc. may be first held to better understand the technical criteria for the public works products along with tender provisions with which these can be introduced. Regarding the data taken from GeM, it was said that while value may be considered, number of tenders floated for the particular item may not be of significance.

7. UNEP strongly suggested that Air Conditioners (ACs) may be considered as third item being low hanging fruit for SPP implementation. There are manufacturers that are already manufacturing ACs as per European standards that take into account sustainability aspects. These ACs are exported to foreign markets.

8. After the detailed deliberations, the three products identified were Paper, Disinfectants and ACs.

9. DoE enquired from CICESD on the next step after the finalization of this study and the timeline involved. CICESD stated that the next step would be the Market Assessment study for the shortlisted products that shall be completed in two months. They shall be able to come with the results by middle of August, 2019. The Market Assessment study shall focus on the demand and supply of the shortlisted products,

(3)

availability of eco-labels and study on existing standards along with procurement criteria.

10. UNEP also informed that they are planning to hold a workshop on Life Cycle Costing (LCC). It was informed that MoF will separately consider the proposal. UNEP stated that USAID desires to be part of the SPP efforts of GoI by providing technical resource personnel to UNEP. It was informed to UNEP that USAID may write to their nodal Ministry/ Department for the same.

11. The meeting ends with thanks to the Chair.

**Annexure-A**

**List of Participants**

| S.# | Name | Designation | Ministry/ Department | Contact No. | Email |
|---|---|---|---|---|---|
| 1 | Sanjay Prasad | Joint Secretary | Department of Expenditure, Ministry of Finance (MoF) | 011-23093382 | js.pfc2.doe@gov.in |
| 2 | Sanjay Aggarwal | Director | Department of Expenditure, MoF | 011-23094961 | sanjay.aggarwal68@nic.in |
| 3 | Vikram Rajvanshi | Consultant | Department of Expenditure, MoF | 9810278304 | civil.vikram@gmail.com |
| 4 | Atul Bagai | Country Head, India | UNEP | 9891415980 | bagai@un.org |
| 5 | Soumya Bhattacharya | Programme Manager | UNEP | 9891746630 | soumya.bhattacharya@un.org |
| 6 | Divya Datt | Programme Management Officer | UNEP | 9811683324 | divya.datt@un.org |
| 7 | Shailly Kedia | Fellow | TERI | 9717377878 | shailly.kedia@teri.res.in |
| 8 | Sachin Joshi | COO | CII | 9873114155 | sachin.joshi@cii.in |
| 9 | Nandini Kumar | Consultant | CII | 9818128824 | nandini.kumar@cii.in |

# Annex 2: Long list of products for prioritization

**Table 16: Long list of selected products for Sustainable Public Procurement**

| | Type of Product | Product | Eco Label | | | Value | Volume | Environmental Impact | | | Socio-economic impact |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | E & M | In-use | EOL | | | E & M | In-use | EOL | |
| **1** | Office IT equipment | 1. Printer/copier | Not available | Energy star | HWM Rules | H | H | M | L | H | H |
| | | 2. Desktop | Not available | Energy star | HWM Rules | H | H | M | L | H | H |
| | | 3. Laptop | Not available | Energy star | HWM Rules | H | H | M | L | H | H |
| | | 4. Monitor | Not available | Energy star | HWM Rules | H | H | M | L | H | H |
| | | 5. Tablet | Not available | Energy star | HWM Rules | H | H | M | L | H | H |
| **2** | Paper | 1. Writing and printing paper | FSE and ECF certification BIS standard IS: 1848: 2007 | NA | Not available | H | H | M | L | L | H |
| **3** | Cleaning and disinfecting solutions | 1. Soap | Not available | NA | NA | L | L | L | L | L | L |
| | | 2. Disinfectants | Not available | NA | NA | L | H | H | H | H | M |
| | | 3. Glass-cleaning chemicals | Not available | NA | NA | L | L | L | L | L | L |
| **4** | Office furniture | 1. Chairs | Not available | NA | NA | H | H | L | L | H | M |

| | Type of Product | Product | Eco Label | | | Value | Volume | Environmental Impact | | | Socio-economic impact |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | E & M | In-use | EOL | | | E & M | In-use | EOL | |
| | | 2. Tables | Not available | NA | NA | H | H | L | L | H | M |
| **5** | Lighting | 1. LED lamps | Not available | NA | NA | H | H | L | L | H | L |
| **6** | Medical devices | 1. IV sets (DEHP/PVC free) | Not available | NA | Bio-medical waste Rules | L | H | M | L | H | H |
| **7** | Stationery | Pens, files, folders, etc. | Not available | NA | NA | L | H | M | L | M | L |
| **8** | Mobile phones | Mobile phones | Not available | NA | NA | M | L | H | L | H | H |
| **9** | Electrical appliances | 1. Coolers | Not available | NA | NA | M | H | L | L | H | H |
| | | 2. Water heaters | Not available | BEE | NA | L | L | L | M | M | M |
| **10** | Public works | 1. Cement | Not available | NA | NA | H | H | H | L | H | L |
| | | 2. Steel | Not available | NA | NA | H | H | H | L | M | H |
| | | 3. Bricks | Not available | NA | NA | H | H | H | L | L | H |

# Annex 3: Notification from public procurement for paper

File No: P-20028/19/2018-PAPER

**Government of India**
**Ministry of Commerce & Industry**
**Department for Promotion of Industry & Internal Trade**
**(Paper Section)**

**Udyog Bhawan, New Delhi**
**Dated: 04th February 2021**

**ORDER**

Subject: Public Procurement (Preference to Make in India), Order 2017-Notifying Paper in furtherance of the Order.

The Government of India has issued Public Procurement (Preference to Make in India), Order 2017 vide the Department for Promotion of Industry & Internal Trade (DPIIT) Notification no. P-45021/2/2017-B.E.-II dated 15.06.2017 (as amended on 16/09/2020) to encourage 'Make in India' and to promote manufacturing and production of goods and services in India with a view to enhancing income and employment.

2. In reference to clause 3(a) of Public Procurement (Preference to Make in India), Order 2017 (as amended on 16/09/2020), it is hereby notified that there exists sufficient local capacity and local competition in respect of following types of paper and only Class-I Local Suppliers shall be eligible to bid for all public procurement irrespective of purchase value:

| S.No. | Type of Paper | Relevant BIS Standard | Minimum Local Content for Class-I Supplier (%) |
|---|---|---|---|
| 1 | Writing & Printing Paper (WPP), | IS 1848: 2018 | 80 |
| 2 | Copier paper (cut size) | IS 14490:2018 | 75 |
| 3 | Art Paper | IS 4658:2019 | 50 |
| 4 | Art Card | IS 4658:2019 | 50 |
| 5 | Kraft Paper | IS 1397:2020 | 60 |
| 6 | Newsprint | IS 11688:2016 | 50 |
| 7 | Security Paper (MICR, Check Paper | IS:11087:2016 | 70 |

3. This Order shall come into effect immediately.

4. DPIIT shall be the Nodal Ministry to monitor the implementation of Order on Paper.

4/2/21

(Anil Agrawal)
Joint Secretary to Government of India
Tele: 23063838

**Copy to:**

1. All Ministries/Departments of Government of India
2. Cabinet Secretariat
3. Prime Minister Office
4. NITI Aayog, New Delhi
5. Joint Secretary(DPIIT), Member-Convenor of Standing Committee of Public Procurement(Preference to Make in India), Order,2017
6. Comptroller and Auditor General of India
7. AS & FA , Department for Promotion of Industry & Internal Trade
8. Internal Distribution

(Anil Agrawal)
Joint Secretary to Government of India
Tele: 23063838

# Annex 4: BIS Eco-mark criteria for paper



भारतीय मानक
Indian Standard

IS 1848 (Part 1) : 2018

## लेखन और मुद्रण कागज — विशिष्टि

भाग 1 अकाउंट बुक, एजोर लेड, बॉण्ड, क्रीम लेड और क्रीम वोव/वाइट प्रिंटिंग/रंगीन प्रिंटिंग/ऑफसेट प्रिंटिंग और टाइपराटिंग प्ररूप

*( पाँचवा पुनरीक्षण )*

## Writing and Printing Papers — Specification

**Part 1 Account Book, Azure Lead, Bond, Cream Laid and Cream Wove/Printing White/Printing Coloured/Printing Offset, Printing Maplitho, Printing White Super Calendered and Typewriting Types**

*( Fifth Revision )*

ICS 85.080.10



भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुरशाह ज़फर मार्ग, नई दिल्ली-110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI-110002
www.bis.gov.in www.standardsbis.in

December 2018 Price Group 2

Paper and its Products Sectional Committee, CHD 15

FOREWORD

This Indian Standard (Part 1) (Fifth Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Paper and its Products Sectional Committee had been approved by the Chemical Division Council.

This standard was first published in 1961 and subsequently revised in 1971, 1981, 1991 and 2007. The Committee responsible for the formulation of this standard decided to revise it further. Changes made in this standard through splitting of standard in two parts. The 19 different varieties covered in one standard in earlier version were divided in two parts of standard based on application of varieties of writing and printing paper. This part covers account book, azure laid, bond, cream laid and cream wove/printing white/printing coloured/printing offset, Printing maplitho, Printing white super calendered and typewriting varieties of writing and printing papers. The amendments have been amalgamated and requirements have been modified and upgraded in this revised edition. The requirement of mechanical pulp has been made more stringent by reducing its limit. The clause for selection of sample size for determination of substance has been modified. The requirement of *p*H has been modified. Packaging and marking clause has also been modified. References of latest available test method standards have also be made in this standard. Some of the varieties which are not at all being used have been removed.

A scheme for labelling environment friendly products known as ECO-Mark has been introduced at the instance of the ministry of Environment and Forests and Climate Change (MoEF&CC),Government of India. The ECO-Mark would be administered by the Bureau of Indian Standards (BIS) under the *Bureau of Indian Standards Act,* 2016 as per the Resolution No. 71 dated 21 February 1991 and No. 425 dated 28 October 1992 published in the Gazette of the Government of India. For a product to be eligible for marking with ECO logo, it shall also carry the ISI Mark of BIS besides meeting additional optional environment friendly (EF) requirements. For this purpose, the Standard Mark of BIS would be a single mark being a combination of the ISI Mark and the ECO logo. Requirements to be satisfied for a product to qualify for the BIS Standard Mark for ECO friendliness, will be optional; manufacturing units will be free to opt for the ISI Mark alone also.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'.

*Indian Standard*

# WRITING AND PRINTING PAPERS — SPECIFICATION

## PART 1 ACCOUNT BOOK, AZURE LEAD, BOND, CREAM LAID AND CREAM WOVE/ PRINTING WHITE/PRINTING COLOURED/PRINTING OFFSET, PRINTING MAPLITHO, PRINTING WHITE SUPER CALENDERED AND TYPEWRITING TYPES

*( Fifth Revision )*

### 1 SCOPE

**1.1** This standard (Part 1) prescribes requirements and methods of sampling and test forwriting and printing papers.

**1.2** This standard Part 1 covers account book, azure laid, bond, cream laid and cream wove/printing white/ printing coloured/printing offset, printing maplitho, printing white super calendered and typewriting varieties of writing and printing papers.

### 2 REFERENCES

The standards listed below contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

| *IS No.* | *Title* |
|---|---|
| 1060 (Part 1) : 1966 | Methods of sampling and test for paper and allied products: Part 1 |
| 1060 (Part 3) : 1969 | Methods of sampling and test for paper and allied products: Part 3 |
| (Part 5) | Methods of test for paper and board |
| (Sec 4) : 2014 | Determination of water absorptiveness — Cobb method |
| ISO 535 : 1991 (Sec 5) : 2014 | Determination of grammage |
| ISO 536 : 2012 (Sec 6) : 2014 | Determination of tensile properties — Constant rate of elongation method 20 mm min |
| ISO 1924-2 : 2008 | |
| (Part 6) (Sec 1) : 2014 | Methods of test for paper |
| ISO 1974 : 2012 | Determination of tearing resistance — Elmendorf method |
| (Sec 3) : 2015 ISO 5626 : 1993 | Determination of Folding Endurance of Paper |
| 1064 : 1980 | Specification for paper sizes |
| 1763 : 1961 | Specification for substances of paper and pulp board |
| 4661 : 1999 | Glossary of terms used in paper trade and industry (*second revision*) |
| 5285 : 1998 | Fibre analysis of paper and board — Methods of test (*first revision*) |
| 6211 : 1993 | Code of practice for packaging of paper and board (*first revision*) |
| 9894 : 1981 | Method of test for smoothness/ roughness of paper |
| IS/ISO 2470 (Part 1) : 2009 | Paper, board and pulps — Measurement of diffuse blue reflectance factor: Part 1 Indoor Daylight Conditions (ISO Brightness) |
| IS/ISO 2471 : 2008 | Paper and board determination of opacity paper backing diffuse reflectance method |
| IS/ISO 8254 (Part 1) : 1999 | Paper and Board Measurement of Specular Gloss: Part 1 75° Gloss with a converging beam tappi method |

### 3 TERMINOLOGY

For the purpose of this standard, the definitions and terms given in IS 4661 shall apply.

### 4 REQUIREMENTS

**4.1** Writing and printing papers shall be uniform formation, machine finished (MF) and shall be free from specks, holes and other blemishes. When tested according to **12** of IS 5285, the furnish for all varieties shall not containmore than 15 percent mechanical pulp.

**4.2** The substance of writing and printing papers shall be as prescribed in IS 1763. For determination

of substance, select 10 sheets at random and cut a test piece of size 25 cm × 25 cm from each sheet. In case the sample size is not sufficient, select 20 sheets and cut a test piece of size10 cm x 10 cm. Proceed as prescribed in IS 1060 (Part 5/Sec 5).

**4.2.1** No single test result shall vary by more than ± 5 percent from the nominal substance. Further, the mean of 10/20 test results (whichever is applicable) shall not vary from the nominal substance by more than ± 2.5 percent (*see* note 1). However, where 2.5 percent of mean of 10/20 test results (whichever is applicable) as calculated above is less than 1.5g/m², the tolerance shall be ± 1.5 g/m².

**4.2.2** The tolerance of ± 2.5 percent shall be allowed on the mass of the ream, when calculated according to the following formula (*see* Note) :

$$R = \frac{(A \times B \times C) + D}{1\,000}$$

where

$A$ = nominal substance of paper, in g/m²;

$B$ = nominal number of sheets of paper in a ream;

$C$ = nominal area of each sheet, in m²;

$D$ = nominal mass of the wrapping paper, in g; and

$R$ = nominal mass of ream of paper, in kg.

NOTE — The chargeable weight should be net weight excluding the weight of packing.

**4.3** A tolerance of ± 10 percent or ± 20 microns, whichever is less, shall be permitted on the nominal thickness, if specified by the purchaser, when tested according to **7** of IS 1060 (Part 1).

### 4.4 Sizes and Tolerance on Size

Trimmed sizes of writing and printing papers shall be in accordance with IS 1064. The permissible tolerance on the size shall be in accordance with **4** of IS 1064.

**4.5** The hot extract *p*H value for all types of writing and printing papers shall be not less than 6.5 when tested according to **10** of IS 1060 (Part 1).

**4.6** The writing and printing papers shall also comply with the requirements given in Table 1.

**4.7** In the case of coloured paper, the colour should be an approximate match to the shade approved by the purchaser. The requirement for brightness shall not apply in case of coloured paper and printed paper. (See Table 1)

### 4.8 Additional Requirements for ECO-Mark

**4.8.1** *General Requirements*

**4.8.1.1** The product shall conform to the requirements for quality and performance prescribed in **4.1** to **4.7**.

**4.8.1.2** The manufacturer shall produce to BIS, the environmental consent clearance from the concerned State Pollution Control Board as per the provisions of *Water* (*Prevention and Control of Pollution*) *Act,* 1974 and *Air* (*Prevention and Control of Pollution*) *Act,* 1981 along with the authorization, if required, under the *Environment* (*Protection*) *Act,* 1986 and the Rules made thereunder, while applying for ECO-Mark.

**4.8.2** *Specific Requirements*

- The paper and paper boards manufactured out of pulp containing not less than 60 percent by weight of pulp made from materials other than bamboo, hardwoods, softwoods and reed.
- Recycled paper and paper board must be made from 100 percent waste paper.

## 5 PACKING AND MARKING

### 5.1 Packing

The packing of paper shall be done so as to ensure that the paper in not damaged due to handling, transportation and prevailing climatic condition of the area and shall be as agreed to between the purchaser and the supplier (*see* IS 6211).

**5.1.1** For ECO-Mark, the product shall be packed in such packages which shall be recyclable /reusable or biodegradable.

### 5.2 Marking

Each package shall be marked with the following particulars:

a) Description and substance of the paper, in g/m²;

b) Size of the paper;

c) Mass of 500 sheets including wrapping paper, in kg/ream. Chargeable weight should be read as net weight excluding the weight of packing.

d) Lot number;

e) Month and year of manufacture; and

f) Name and address of manufacturer.

**Table 1 Requirements for Writing and Printing Papers**

(*Clauses* 4.6, 4.7 *and* 6.2)

| Sl No. | Type of Paper | Tensile Index Nm/g | | Brightness ISO[1], Percent | Opacity Percent | One Minute Cobb Test | Double Fold | | Gloss[2] Percent | Wax Pick | Smoothness (Bendtsen) ml/min | Tear Index mN.m²/g | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *Min* | | *Min* | *Min* | *Max* | *Min* | | *Min* | | *Max* | *Min* | |
| | | CD | MD | | | Average | CD | MD | | | | CD | MD |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) |
| i) | Account book | 17 | 25 | 80 | 85 | 25 | 10 | 15 | - | No pickon 8A | 300 | 4.0 | 3.5 |
| ii) | Azure laid | 17 | 25 | - | 85 | 25 | 10 | 15 | - | - | 280 | 4.0 | 3.5 |
| iii) | Bond | 25 | 40 | 90 | 90 | 25 | 10 | 15 | - | - | 350 | 5.0 | 4.0 |
| iv) | Cream laid and cream wove/ printing white/ printing coloured/ printing offset | 17 | 25 | 78 | 85 | 25 | - | - | - | No pickon 8A | 300 | 4.0 | 3.5 |
| v) | Printing, maplitho | 20 | 30 | 82 | 85 | 25 | 10 | 15 | - | No pickon 10A | 300 | 4.0 | 3.5 |
| vi) | Printing, white super calendered | 17 | 25 | 80 | 75 | 25 | - | - | 15 | - | - | 4.0 | 3.5 |
| vii) | Typewriting | 20 | 25 | 75 | - | 25 | - | - | - | - | 300 | 4.0 | 3.5 |
| viii) | IS/ISO 2470 (Part 1) | - | - | √ | - | - | - | - | - | - | - | - | - |
| ix) | IS 1060 (Part 3) | - | - | - | - | - | - | - | - | **8** | - | - | - |
| x) | IS 9894 | - | - | - | - | - | - | - | - | - | **3** | - | - |
| xi) | IS 1060 (Part 5/Sec 6) | √ | √ | - | - | - | - | - | - | - | - | - | - |
| xii) | IS/ISO 2471 | - | - | - | √ | - | - | - | - | - | - | - | - |
| xiii) | IS 1060 (Part 5/Sec 4) | - | - | - | - | √ | - | - | - | - | - | - | - |
| xiv) | IS 1060 (Part 6/Sec 3) | - | - | - | - | - | √ | √ | - | - | - | - | - |
| xv) | IS/ISO 8254 (Part 1) | - | - | - | - | - | - | - | √ | - | - | - | - |
| xvi) | IS 1060 (Part 6/Sec 1) | - | - | - | - | - | - | - | - | - | - | √ | √ |

[1] Only for white papers.

[2] Tensile index = (Breaking length × 0.009 8); Tear index = (Tear factor × 0.098)

CD = Cross direction MD = Machine direction

**5.2.1** For ECO-Mark, following additional information may also be marked on the container/ package:

The criteria for which the product has been labelled with ECO-Mark.

**5.2.2** *BIS Certification Mark*

Each package may also be marked with the Standard Mark.

**5.2.2.1** The use of the Standard Mark is governed by the provisions of *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufactures or producers may be obtained from the Bureau of Indian Standards.

## 6 SAMPLING

**6.1** Representative samples for test shall be drawn as given in **3** of IS 1060 (Part 1).

### 6.2 Number of Tests

Each of the selected units shall first be tested for requirements given in **4.2**. Then from each of these units, number of sheets sufficient to carry out all tests specified in Table 1shall be taken out at random. The sheets shall first be examined for the requirements given in **4.1, 4.3, 4.4, 4.5** and **4.7** and then number of test pieces for each of the characteristic as indicated in its test method shall be cut from them. These pieces shall be tested according to the methods specified in Table 1.

### 6.3 Criterion for Conformity

**6.3.1** A sheet not meeting the relevant requirements for any one or more characteristics shall be considered as defective.

**6.3.2** A lot shall be declared as conforming to the requirements of this specification, if the number of defective sheets found, does not exceed the acceptance number. This acceptance number is zero for the requirement for substance (*see* **4.2**) and for all other requirements depends upon the size of the sample and shall be equal to zero, if the size is less than 13 and 1, if the size is greater than or equal to 13.

## Annex 5: Eco-Mark Writing and Printing paper [IS 1848 (Part 1): 2018] produced for the financial year 2020-21 as per the information provided by BIS

| Sl. No. | CM/L | Name of the Licensee | Installed Capacity | Presently How Much Quantity is being produced under the Eco-Mark | Maximum How Much Quantity they can produce with Eco-Mark | Analysed production value of Eco-Mark paper for FY 2020-21 in MT (as per Column F) |
|---|---|---|---|---|---|---|
| A | B | C | E | F | G | H |
| 1 | 7200175311 | Shree Rama Newsprint Limited, Surat | 1,32,000 Metric Tonnes Per Annum | Nil | 1,32,000 Metric Tonnes Per Annum | |
| 2 | 2837469 | Shah Paper Mills Limited, Valsad | 130 Metric Tonnes Per Day | Nil | 130 Metric Tonnes Per Day | |
| 3 | 2837368 | Shah Paper Mills Limited, Valsad | 175 Metric Tonnes Per day | 1420 Metric Tonnes during last year | 175 Metric Tonnes Per Day | 1420 |
| 4 | 7200127296 | N R Agarwal Industries Limited, Valsad | 1,20,000 MT per annum | 463.52 Metric Tonnes During Last Year | 1,20,000 MT per annum | 463.52 |
| 5 | 7200022181 | N R Agarwal Industries Limited, Valsad | 90,000 Metric Tonnes per annum | 17179.84 Metric Tonnes During Last Year | 90,000 Metric Tonnes per annum | 17179.84 |
| 6 | 8300102295 | Prolific Papers (P) Ltd., Udham Singh Nagar | 100 MT/day | Nil | 100 MT/day | |
| 7 | 8300121505 | FIBREMARX PAPERS PRIVATE LIMITED, Udham Singh Nagar | 150 MT/day | 5659.621 MT (21.91%) | 150 MT/day | 5659.62 |
| 8 | 3293763 | KATYAYINI PAPER MILLS (P) LTD., Udham Singh Nagar | 180 MT/day | 3429.589 MT (15.54%) | 180 MT/day | 3429.59 |
| 9 | 9297195 | Century Pulp and Paper, Nainital | 485 MT/day | Nil | 250 MT/day | |
| 10 | 8700068119 | CHADHA PAPERS LTD., Rampur | 146000 MT/annum | 16451.875MT | 54750 MT/annum | 16451.88 |
| 11 | 8700095114 | KAMAKSHI PAPERS PVT LTD, | 60 MT/Day | 0 | 60 MT/Day | |

| Sl. No. | CM/L | Name of the Licensee | Installed Capacity | Presently How Much Quantity is being produced under the Eco-Mark | Maximum How Much Quantity they can produce with Eco-Mark | Analysed production value of Eco-Mark paper for FY 2020-21 in MT (as per Column F) |
|---|---|---|---|---|---|---|
| | | Jyotiba Phule Nagar | | | | |
| 12 | 8700095013 | MOHIT PAPER MILLS L.T.D, Bijnor | 100 MT/Day | 0 | 100 MT/Day | |
| 13 | 9858617 | K R Pulp & Papers Ltd (Unit -II), Shahjahanpur | 6000 MT/ annum | 6000 MT | 6000 MT/annum | 6000 |
| 14 | 9300048109 | Bajaj Kagaj Ltd., Unnao | 18000 MT/ annum | 18000 MT | 18000 MT/annum | 18000 |
| 15 | 2009432 | M/s. Delta Paper Mills, West Godavari | 40000 MT/ annum | NIL | 40000 MT/ annum | |
| 16 | 9433177 | Trident Ltd., Sangrur | 450 MT/day | 3454.6 MT (April 2020-April 2021) | 24000 MT/ annum | 3454.6 |
| 17 | 9431375 | Shreyans Industries Ltd., Sangrur | 54000 MT/Per Annum | April 2021:1601.525, May 2021 2362.001MT, June 2021 911.154 MTS | 54000 MTs per annum | 1601.525 |
| 18 | 4863379 | Shreyans Industries, Shahid Bhagat Singh Nagar | 40000 MT/Per Annum | NIL | 40000 MTs per annum | |
| 19 | 9800049417 | Vishal Paper Industries Pvt. Ltd., Patiala | 60 MT/day | NIL | 60 MT per day | |
| 20 | 9432478 | Satia Industries Ltd., Sri Muktasar Sahib | 100000 MT/ annum | 25.3 MT (Due to Covid 16 less demand of orders) | As per Market Requirement | 25.3 |
| 21 | 9800025916 | DSG Papers Private Ltd., Patiala | 150 MT/day | 4160 MT in Last one year | 150 MT/day | 4160 |
| 22 | 9800008815 | Vishal Coaters Pvt. Ltd., Patiala | 150 MT/day | NIL | 150 MT/day | |
| 23 | 8551986 | M/s. Orient Paper Mills, Shahdol | 150 MT/day | NIL | 150 MT/day | |

| Sl. No. | CM/L | Name of the Licensee | Installed Capacity | Presently How Much Quantity is being produced under the Eco-Mark | Maximum How Much Quantity they can produce with Eco-Mark | Analysed production value of Eco-Mark paper for FY 2020-21 in MT (as per Column F) |
|---|---|---|---|---|---|---|
| 24 | 9800048120 | KHANNA PAPER MILLS LIMITED, Amritsar | 300 MT/day | NIL | 200 MT/day | |
| 25 | 9800033014 | LADHAR PAPER MILLS | 100 MT/day | NIL | 80 MT/day | |
| 26 | 9800005514 | Kuantum Papers Ltd. | 450 MT/day | NIL | 150 MT/day | |
| | | | | | | **77845.875** |

# Annex 6: Typical tenders for ACs[24]

**Case 1: Tender for RACs (through GEM Portal) by Dept. of School and Education under MoHRD in June 2019**

| No. | Criteria parameter | Requirement |
|---|---|---|
| 1. | RAC type | Split |
| 2. | Technology (variable /fixed speed) | Variable speed |
| 3. | Nos. required | 04 |
| 4. | Capacity | 1.5 ton |
| 5. | BEE star rating (minimum) | 3 star |
| 6. | Rated ISEER | Not defined |
| 7. | Cooling capacity | 1.5/4500 (Ton/kcal/hr) |
| 8. | Noise | Not defined |
| 9. | Refrigerant | Eco-friendly |
| 10. | Warranty | 5 years on compressor |
| 11. | Compressor type | Not defined |
| 12. | Refrigerant piping material | Copper |
| 13. | Installation | Yes, with components defined (inclusive) |
| 14. | AMC | Not defined |
| 15. | Buy-back clause | Not defined |

**Case 2: Tender for RACs by Balmer Lawrie & Co. Ltd. (Govt. of India Enterprise) in April 2019**

| No. | Criteria parameter | Requirement | |
|---|---|---|---|
| 1. | RAC type | Split | Window |
| 2. | Technology (variable /fixed speed) | Variable speed | Variable speed |
| 3. | Nos. required | 02 | 10 |
| 4. | Capacity | 1.5 ton | 1.5 ton |
| 5. | BEE star rating (minimum) | 5 stars | 5 star |
| 6. | Rated ISEER | Not defined | 3.31 |
| 7. | Cooling capacity | Not defined | 5100 W |
| 8. | Noise | Not defined | dB (A) 54 |

[24] Source: Information summarized in this section is based on tender document available in public domain. The project team makes no representations, or warranties implied, or responsible for correctness of the data collated. The project team is not responsible for the reader's use of, or reliance upon, the report, nor any decisions based on the report.

| No. | Criteria parameter | Requirement | |
|---|---|---|---|
| 9. | Refrigerant | Not defined | R-22 |
| 10. | Warranty | Asked from bidders | Asked from bidders |
| 11. | Compressor type | Not defined | High EER Rotary |
| 12. | Refrigerant piping material | Not defined | Copper (inner groove) |
| 13. | Installation | Yes, costing asked | Yes, costing asked |
| 14. | AMC | No | No |
| 15. | Buy-back clause | Yes, buy-back costing asked | Yes, buy-back costing asked |

**Case 3: Purchase of RACs (through GEM Portal) by Coal India Ltd. in April 2018**

| No. | Criteria parameter | Requirement |
|---|---|---|
| 1. | RAC type | Split |
| 2. | Technology (variable /fixed speed) | Not defined (fixed – checked through model no.) |
| 3. | Nos. required | 398 |
| 4. | Capacity | 1.5 ton |
| 5. | BEE star rating (minimum) | 5 star |
| 6. | Rated ISEER | Not defined |
| 7. | Cooling capacity | 1.5/4500 (Ton/kcal/hr) |
| 8. | Noise | Not defined |
| 9. | Refrigerant | Eco-friendly (R22 – checked through model no.) |
| 10. | Warranty | 5 years on compressor |
| 11. | Compressor type | Not defined |
| 12. | Refrigerant piping material | Copper |
| 13. | Installation | Yes, with components defined (inclusive) |
| 14. | AMC | Not defined |
| 15. | Buy-back clause | Not defined |

**Case 4: Tender for RACs by National Institute of Immunology, Delhi (MoST, Govt. of India) in December 2017**

| No. | Criteria parameter | Requirement |
|---|---|---|
| 1. | RAC type | Split |
| 2. | Technology (variable /fixed speed) | Not defined |
| 3. | Nos. required | 03 |
| 4. | Capacity | 2 ton |

| No. | Criteria parameter | Requirement |
|---|---|---|
| 5. | BEE star rating (minimum) | 3 star |
| 6. | Rated EER | 3.11 |
| 7. | Cooling capacity | Not defined |
| 8. | Noise | Not defined |
| 9. | Refrigerant | Not defined |
| 10. | Warranty | Not defined |
| 11. | Compressor type | Scroll type<br>(suitable for commercial/Industrial use at ambient temperature of 52 deg. Celsius) |
| 12. | Refrigerant piping material | Copper |
| 13. | Installation | Yes, with components defined |
| 14. | AMC | Not defined |
| 15. | Buy-back clause | Buy back of old split air conditioner with other accessories AS IS WHERE IS BASIS |

**Case 5: Tender for RACs by Mangalore Refinery and Petrochemicals Ltd. (Subsidiary of ONGC) in December 2017**

| No. | Criteria parameter | Requirement |
|---|---|---|
| 1. | RAC type | Split |
| 2. | Technology (variable /fixed speed) | Not defined |
| 3. | Nos. required | 200 |
| 4. | Capacity | 1.5 ton |
| 5. | BEE star rating (minimum) | 5 star |
| 6. | Rated EER | Not defined |
| 7. | Cooling capacity | Not defined |
| 8. | Noise | Not defined |
| 9. | Refrigerant | R-410A |
| 10. | Warranty | 5 years on compressor |
| 11. | Compressor type | Not defined |
| 12. | Refrigerant piping material | Copper |
| 13. | Installation | Yes, with components defined |
| 14. | AMC | Not defined |
| 15. | Buy-back clause | Not defined |

**Case 6: Tender for RACs by National Centre For Disease Informatics and Research, Bengaluru (Govt. of India) in February 2017**

| No. | Criteria parameter | Requirement | |
|---|---|---|---|
| 1. | RAC type | Split | Split |
| 2. | Technology (variable /fixed speed) | Variable speed | Variable speed |
| 3. | Nos. required | 15 | 15 |
| 4. | Capacity | 2 ton | 1 ton |
| 5. | BEE star rating (minimum) | Not defined | Not defined |
| 6. | Rated ISEER | Not defined | Not defined |
| 7. | Cooling capacity | Not defined | Not defined |
| 8. | Noise | Less than 40 dB | Less than 35 dB |
| 9. | Refrigerant | R-134A/R-401A | R-134A/R-401A |
| 10. | Warranty | 5 years on compressor & condenser | 5 years on compressor & condenser |
| 11. | Compressor type | Not defined | Not defined |
| 12. | Refrigerant piping material | Copper | Copper |
| 13. | Installation | Yes, with components defined | Yes, with components defined |
| 14. | AMC | 3 years after first year | 3 years after first year |
| 15. | Buy-back clause | Not defined | Not defined |

# Annex 7: Information on Registered E-Waste Dismantlers/ Recyclers in the country

(as on 29-12-2016)

| Sl. No | State | Number of Registration Recycler | Name & Address<br>Capacity in Metric Ton per Annum (MTA) |
|---|---|---|---|
| 1. | **Chhattisgarh** | **2 Unit** | 1. **M/s. Navrachna Recycling Pvt. Ltd.,** Plot no. 1B, Somni Industrial Area, Distt. -Rajnandgaon - 491441 (C.G.)<br>**(03 Tons/Day = 900 MTA with 300 days of operation)**<br>2. **M/s. ADV Metal Combine Pvt. Ltd.,** Shed No. -25, Borai Industrial Growth Center, Rasmada, Dist.- Durg (C.G)<br>**(2.5 Tonnes/day) (750 MTA)**<br>**Total = 1650 MTA** |
| 2. | **Gujarat** | **12 Unit** | 1. **E-Process House,** Plot No. 136/F-1. 2nd Phase, GIDC, Dist Valsad VAPI 396195 **(350 MTA)**<br>2. **E-coli Waste Management P. Ltd,** Plot No.-90 TO 92 Sabar Industrial Park P.ltd Vill-Asal Ta-Bhiloda Dist-Sabarkantha Himmatnagar **(6012 MTA)**<br>3. **ECS Environment Ltd,** ECS House, 11-12 Garden View, Opp. Auda Garden, Sindhu Bhawan road, Off SG Highway-Pakwan Circle, Bodakdev, Ahmedabad 380054 **(4999.92 MTA)**<br>4. **Pruthavi E-Recycle Pvt. Ltd.,** Plot No.- 31/32 Golden Industries Area Near Rolex Industries Vill- Kothariya Rajkot **(1069.2 MTA)**<br>5. **M/s. Earth E-Waste Management Pvt. Ltd.,** Block No. 63, Sagun Ind. Estate, Type-A Paiky 11-A, Plot No. 1 to 5 & 10-D, Plot No. 1 to 5, Vill-Altodara, Tal. Opad, Dist. Surat – 394130 **(6000 MTA)**<br>6. **M/s. Gujarat Refilling Centre. 951/5, 1st** Floor, GIDC, Opp. ERDA House, ERDA Road, Makarpura, Vadodara- 390010 **(1,60,000 Nos) (100 MTA)**<br>7. **M/s. Greencare E-Recycle Company,** Survey No. 223/P, Plot No. 4, New Somnath Industrial -3 Vill-Kotharitya Dist-Rajkot (**2418 MTA**)<br>8. **M/s Felix Industries Pvt. Ltd.** (Old Name: M/s PSM Overseas) E-56, Electronic Estate, GEZIA, G.I.D.C., Sector-26, Gandhinagar (**6000 MTA**)<br>9. **M/s Recotech E-waste Management**, Plot No. 36-37, Aashirwad Industrial Estate, Udhana -Sachin Road, GIDC Naka, Sachin, Surat. (**2501 MTA**)<br>10. **M/s. E-front line recycling Pvt. Ltd.,** Shed No. C1B-905/9, GIDC, Panoli, Tal: Ankleshwar, Dist.: Bharuch, Gujarat-394116 (**3600 MTA**)<br>11. **M/s Dron E-waste Solution.,** Plot No. 56, G.I.D.C., Gozariya, Tal & Dist.: Mehsana, Gujarat, **(3012 MTA)**<br>12. **M/s Eximo Recyclers,** Plot No. 5/3, Raj Industrial Estate, Tal: Savli, Vadodara **(1200 MTA)**<br>**(Total Capacity = 37262.12 MTA)** |

| Sl. No | State | Number of Registration Recycler | Name & Address<br>Capacity in Metric Ton per Annum (MTA) |
|---|---|---|---|
| 3. | **Haryana** | **16 Unit** | 1. **M/s. 3R Recyclers,** Plot No. 266, Sector-8, IMT Manesar Gurgaon **(1800 MTA)**<br>2. **M/s. A 2 Z E-Waste Management ltd.,** P No. 14 and 15 -Roz Meo Indusrial Area, Nuh Mewat. **(2000 MTA)**<br>3. **M/s. Giriraj Metal, P. No. 39** HSIIDC, IE, Kutana, Rohtak. **(2200 MTA)**<br>4. **M/s. Earth Waste Management (P) Ltd.** Khewat No. 769, Khatoni No. 923, KilaNo. 163/12/1/1/1, Sampla-Beri Road Vill-Ismaila-11, Tehsil – Sample, Distt. Rohtak **(600 MTA)**<br>5. **M/s. Exigo Recycling Pvt. Ltd.,** G. T. Road, Samalkha Panipat **(6000 MTA)**<br>6. **M/s. Green World International, Pvt. Ltd.,** GR 60-61 ganpati Industrial Dham Industrial Area Bahadugarh Haryana **(5000 MTA)**<br>7. **M/s. R. K. Sons Enterprises (P) Ltd.,** Vill Lohari, Distt, Jhajjar **(14640 MTA)**<br>8. **M/s. Green Vortex Waste Management, (P), Ltd.,** P. No. 177/7, IMT, Manesar, Gurgaon **(1500 MTA)**<br>9. **M/s. Thapar Disposal Industries,** 902A/5/6, Chara Mandi Road, Ambala City **(1825 MTA )**<br>10. **M/s. Eco Friendly Metal Pvt. Ltd.,** Plot No. A-7, Ind. Estate No. 1, Near MR, Faridabad **(1500 MTA)**<br>11. **M/s. E-Waste Solution,** Industrial Shed 1A, Industrial Estate, Sec-06, Faridabad **(1000 MTA)**<br>12. **M/s. SMS Enterprises,** Plot No. 544 D, 1st Floor, Sec-37, Part –II, Pace City, Gurgaon **(360 MTA)**<br>13. **M/s. Earth Sense Recycle, Pvt. Ltd.,** Plot No. 100, Sector -5, IMT, Manesar, Gurgaon **(2160 MTA)**<br>14. **M/s Mittal Battery Industry,** Plot No.349, Indl. Area, Phase-I, Panchkula**. (3600 MTA)**<br>15. **M/s. Namo E-Waste Management Ltd.,** 14/1, Mathura Road, Faridabad Haryana **(5796 MTA)**<br>16. **M/s. Deshwal Waste Management Pvt. Ltd.,** Plot No. 292, Sector-7 IMT, Gurgaon.<br>(**Total Capacity = 49, 981 MTA)** |
| 4. | **Karnataka** | **57 Unit** | 1. **M/s. Ash Recyclers,** UNIT-II, Shed No. – B-3, KSSIDC Industrial Estate, Hoskote, Bangalore - 562114 (**120 MTA)**<br>2. **M/s. E- Parisara Pvt Ltd**. Plot No. 30-P3, KIADB Industrial Area, Dabaspet, Nelamangala Taluk, Banglore Rural District- 562 111 (**8820 MTA)**<br>3. **M/s. Eco E-waste Recyclers India Pvt.** Ltd, Shed No.26, No.41/1,42/2, 2nd cross, Mutachari Industrial Estate, Mysore Road, Bangalore-99 **(300 MTA)**<br>4. **M/s. Sriram Eco Raksha Computer Services Pvt. Ltd.** No. B-29, KSSIDC Indl. Estate, Bommasandra, Hosur Road, Anekal Taluk, Bangalore – 560 099**. (500 MTA)**<br>5. **M/s. E-Wardd & Co.,** No. 6/1B, 14th Cross Hosur Main Road, |

| Sl. No | State | Number of Registration Recycler | Name & Address<br>Capacity in Metric Ton per Annum (MTA) |
|---|---|---|---|
| | | | Bommanahalli, Banglore -560 068 **(300 MTA)**<br>6. **M/s. K. G. Nandani Enterprises**, #46/4, 46/5, Billakempanahalli Village, Bidadi Hobli, Ramanagar (Tauk & District), Pin – 562109, Karnataka State (**7,200 MTA)**<br>7. **M/s. ECO- BIRDD Recycling Company, Pvt.Ltd.** No185, Azeez Sait Industrial area, Nayandahalli, Mysore Road, Bangalore – 560039 **(350 MTA)**<br>8. **M/s. FA Enterprises,** B-8, Tamaka, Kaida, Industrial Area, Kolar, Karnataka - 563101 **(100 MTA)**<br>9. **M/s. Ameena Enterprises**, C-199, KSSIDC Industrial Estate, Hebbal Mysore- 570 017 **(560 MTA)**<br>10. **M/s E-R3 Solutions Pvt. Ltd** – C – 430, 1st Cross, Behind Peenya Police station, 1st Stage Peenya Industrial Area, Peenya Bangalore-560058 **(290 MTA)**<br>11. **M/s. Trishyirya Recycling India Pvt. Ltd.**, No. 315, 4th Phase, Peenya Industrial Estate, Bangalore - 560 058 **(500 MT/A)**<br>12. **M/s. E-Friendly Waste Recyclers,** First Floor, No. 17 1st, Cross, Azeez Sait Industrial Town, Nayandahalli, Bangalore-560039 **(Information on capacity not available at CPCB)**<br>13. **M/s. Tech Logic, Unit-2,** Shed No. 36, 2nd Main, Ranganathapura, Bangalore - 560 044 **(240 MTA)**<br>14. **M/s. Samarthanam Trust** for the Disabled, No. 66. 6th main, 3rd Phase, Peenya Industrial Area, Bangalore - 560 058. **(337.5 MTA) Printer Cartridges**<br>15. **M/s. Sai Recyclers,** No. 20, KSSIDC Industrial Estate, Bhashettihalli, Versandara Post, Doddaballapura Town & Taluk, Bangalore Rural District. **(300 MTA)**<br>16. **M/s. Nobel Technology,** No. 46, 14th Cross, 4th Phase, Peenya Industrial Area, Bangalore - 596 058 (**300 MTA)**<br>17. **M/s. Cerebra Integrated Technologies Ltd,** Plot No. 422/2, 11th cross, 4th phase, 2nd stage, Peenya industrial Area, Bangalore - 560 058 **(600 MTA)**<br>18. **M/s. Ecovision Recycling,** No.D-65, Veerasandra Industrial Area, Hosur Road, Bangalore – 34. **(300 MTA)**<br>19. **M/s. Arrow Systems**, No.SM 3, 4th Phase, 3rd stage, Peenya Industrial Area, Bangalore - 560 058. **(120 MTA)**<br>20. **M/s. Digicomp Complete Solutions Ltd**, No.86, Ground floor, 3rd cross, New Timber yard layout, Mysore Road, Bangalore - 560 026 **(180 MTA)**<br>21. **M/s. Afeefa Spectro Alloys,** Sy.No.289/1, Nagaragere village, Gauribidnur Tq, Chikkaballapura Dist **(300 MTA)**<br>22. **M/s. H. M. G. Eco care Recyclers Pvt. Ltd,** No.C-22, 3rd cross, KSSIDC Industrial Estate, Kumbalgodu, Mysore Road, Bangalore - 560 074. **(300 MTA)**<br>23. **M/s. E-Scrappy Recyclers,** No.106, Andrahalli Main Road, Byreshwara Industrial Area, Peenya 2nd stage, Bangalore - 560 058 **(300 MTA)** |

| Sl. No | State | Number of Registration Recycler | Name & Address<br>Capacity in Metric Ton per Annum (MTA) |
|---|---|---|---|
| | | | 24. **M/s. E- Pragathi (A System of Integrated System soft)** Shed No. M, #405, 2nd Floor, 7th and 8th Cross, 1st Stage Peenya, Bangalore – 560058 **(300 MTA)**<br><br>25. **M/s. Hindustan Computers,** No. V3 & V4, KIADB Industrial Area, Tamaka, Kolar. **(100 MTA)**<br><br>26. **M/s. Trackon E-waste Recyclers Pvt. Ltd,** No.28, Gerupalya, 2nd Phase, Kumbalgodu Industrial Area, Bangalore - 560 074 **(300 MTA)**<br><br>27. **M/s. Rashi E-Waste.,** No. 52/170 & 171, 6th Cross, Aziz Sait Industrial Town, Nayandahalli Post, Bangalore -560039 **(300 MTA)**<br><br>28. **M/s. Rashi E-Waste Solutions Pvt. Ltd.,** SW-51, IShed No. 26, Phase II, Apparel Park, Doddaballapura, Bangalore Rural District<br>**(Information on capacity not available at CPCB)**<br><br>29. **M/s. Green Globe Enterprise,** No. 108/7, 5th Cross, Singasandra Industrial Area, Hosur Road, Bommandahalli, Bangalore-68 **(79 MTA)**<br><br>30. **M/s. 4R Recycling Pvt. Ltd.,** Shed NO. A-5, Industrial Estate, Peenya 3rd Stage Industrial area, Nallakadirenahalli Village, Yeshwanthpur Hobli, Bangalore North Taluk, Bangalore **(600 MTA)**<br><br>31. **M/s. TES-AMM Indian Pvt. Ltd.,** No. A-365, 6th Cross, 1 Stage, Peenya Industrial Estate, Bengaluru 560058 **(12000 MTA)**<br><br>32. **M/s. E-Prarisaraa Pvt. Ltd.,** Unit 2, No-P-10 (a), III Stage, Peenya Industrial Estate, Bangalore- 560058 **(300 MTA)**<br><br>33. **M/s. Shobith Industry** –Unit II, Survey No. B-4/1, KSSIDC Industrial Area, Nanjangud – 571302, Mysore District **(300 MTA)**<br><br>34. **M/s. XL Engineering and Fabricators,** No. B-188, 5th Main, II Stage, Peenya Industrial area, Bangalore- 58 **(34 MTA)**<br><br>35. **M/s. MKK E-Waste Enterprises,** Shed No. 292, Belur Industrial Area, Belur Dharwad District, **(600 MTA)**<br><br>36. **M/s. Sri Sai Company,** Plot No. Q 13, Ground Floor, Industrial Estate, Veerasandra IInd Stage, Bangalore **(300 MTA)**<br><br>37. **Khanija Recycling (formerly Ambush Alied Services Private limited,** No. C-32/2, KSSIDC industrial Estate, Veerasandra, Hosur Road, Attibele Hobli, Bangalore<br>**(Information on capacity is not available at CPCB)**<br><br>38. **M/s. Royal Touch,** No.3/2, Ezickle Industrial Estate, Ward No.94, K.G. Halli, AC Post, Nagavara Main Road, Bangalore - 560 045. **(90 MTA)**<br><br>39. **M/s. Moogambigai Metal Refineries,** No 89 & 90 Industrial Area, Baikampady Mangalore- 575011 **(300 MTA)**<br><br>40. **M/s. KH E-Waste Recyclers,** No. 104, 1st Main Road, 4th Cross, Azeez SAit Industrial Area, Nayandahalli, Bangalore – 39 **(300 MTA)**<br><br>41. **M/s. BSMR Metals, No.** R. O. 7, KSSIDC Industrial Estate, Veerasandra II Stage, Attibele Hobli, Bangalore Urban District **(300 MTA)** |

| Sl. No | State | Number of Registration Recycler | Name & Address<br>Capacity in Metric Ton per Annum (MTA) |
|---|---|---|---|
| | | | 42. **M/s. Greenscape Eco Management Pvt. Ltd.,** Plot No. R-12, Veerasandra Indl Area, Anekal Tq, Bangalore Urban District – 100 **( 600 MTA)**<br><br>43. **M/s. Coral Communication and Networks Pvt. Ltd.,** No. 52, Hoskote Industrial Area, Bangalore Rural District **(2500 MTA)**<br><br>44. **M/s. RPN Industries,** Plot No B2, KSSIDC Industrial Area, Kumbalgodu, Mysore Road, Bangalore-74<br>**(Information on capacity is not available at CPCB)**<br><br>45. **M/s. Intro Tech Recyclers,** No. C-50/1, first floor, KSSIDC industrial estate, Kumbalgodu, Bangalore- 560060 **(300 MTA)**<br><br>46. **M/s. Sogo Synergy Private Limited,** Shed No. A-57, KSSIDC Industrial Estate, Bommasandra, Hosur road, Anekal Taluk, Bangalore Urban District – 560000 **(600 MTA)**<br><br>47. **M/s. General Eco Transtech Private Limited** Shed No. B-15, KSSIDC Industrial Area, Tamaka, Kolar **(Information on capacity is not available at CPCB)**<br><br>48. **M/s. Macro Engineering Services,** No. 427-E2, Hebbal Industrial Area, Mysore- 570018 **(Information on capacity is not available at CPCB)**<br><br>49. **M/s. R. N. Traders,** Plot No. 101 Kumbalgodu village, Bengeri Hobli, Bangalore **(300 MTA)**<br><br>50. **M/s. Terra Firma Biotechnologies Pvt. Ltd.,** No. 22, Srinivasapura Village, Katenahalli, Kolalu Hobli, Kottagere Taluk, Tumkur District **(1800 MTA)**<br><br>51. **M/s. Mak Technology Industrial,** Shed No. SP-5, Veerasandra KSSIDC Industrial Estate, Phase-0-II, 3rd cross, Huskur Min Road, Electronic City post, Bengaluru **(Information on capacity is not available at CPCB)**<br><br>52. **M/s. Earth Sense Recycler Pvt. Ltd.,** Industrial Plot No. Sp;. 14, Jigani 2nd stage, Jigani Village and Hobli, Bangalore-560105<br>**(Information on capacity is not available at CPCB)**<br><br>53. **M/s. E Pragathi Recycling,** Plot No. 66, Road No. 18, Antharasanahalli, Indl Area, IInd Phase, Tumkur.<br>**(Information on capacity is not available at CPCB)**<br><br>54. **M/s. SLV Enterprises,** the Gachaguppe Village Kumbalagodu Post, Kengeri Hobli, Bangalore<br>**(Information on capacity is not available at CPCB)**<br><br>55. **M/s. E-Green Recycling,** Plot No. 86-B, Jigani 1st Phase, Anekal Taluk, Bangalore **(Information on capacity is not available at CPCB)**<br><br>56. **M/s. E Ward and Company,** No. 11, Muthachari Indl. Area, Nayandahalli, Mysore Road, Bengaluru **(Information on capacity is not available at CPCB)** |

| Sl. No | State | Number of Registration Recycler | Name & Address<br>Capacity in Metric Ton per Annum (MTA) |
|---|---|---|---|
| | | | 57. **M/s. Regerlis (India) Private Limited,** No. 86, Ground Floor, NT layout, Mysore Road, Bangalore **(Information on capacity is not available at CPCB)**<br><br>**(Total Capacity – 44620.5 MTA)** |
| 5. | **Maharashtra** | **32 Unit** | 1. **M/s. Earth Sense Recycle Pvt Ltd,** A-7 , Gala no: 1,2&3, Ground Floor, Prena Complex, Anjur Phata, Vill: Val, Tal: Bhiwandi Dist: Thane **(360 MT/A)**<br>2. **M/s. Just Dispose Recycling Pvt Ltd**, A-103,104,110,119, Arvind Industrial Estate, Navghar , Tal: Vasai, Dist: Thane **(500 MT/A)**<br>3. **M/s. Mercury Metal industries,** Plot no. D-48, MIDC Mahad, Tal: Mahad, Dist: - Raigad, Maharashtra. **(500 MT/A)**<br>4. **Sabbir Traders** Plot No.999 (7), Karivali Narayan Kutir Udyog Mandal, Village Adivali, Tal. Panval, Dist. Raigad **(500 MT/A)**<br>5. **M/s Hi- Tech Recycling India (P) Ltd.,** S No. – 571/572, Near Silver Court Hotel, A/P: Bhigaon, Tal: Mulshi, Dist: Pune, Maharashtra **(500 MT/A)**<br>6. **Green World Recycling** Vill: Val, Pritesh Complex, Building No; B-12, Gala No. 7,8 Anjur Phata, Village: Val Tal: Bhiwandi, Dist: Thane **(1000 MTA)**<br>7. **E-Recon Recycling** Gat No. 94, Chitegaon, Tal: Paithan Dist : Aurangabad **(1000 MTA)**<br>8. **M/s. Ecocentric Management Pvt. Ltd.,** Survey No. 25, Plot No. 43, Arkose Ind Estate, Vill: Dheku, Tal: Khalapur, Dist: Raigad **(1200 MTA)**<br>9. **M/s. Clean Tech** B/8, Gali No. 3, Parasnath Indl. Estate, Anjur Phata Road, Village Val, Tal, -Bhiwandi, Dist.- Thane **(2000 MTA)**<br>10. **M/s. Arihant E-Recycling Ltd**. Gat No. 307/1, Shada Road, Dodaiacha Tal: Sindkheda Dist: Dhule **(360 MTA)**<br>11. **M/s. Z-Tronics Infratel Pvt. Ltd.,** Survey No: 103, Gala No: 538, 539 At Village: Pimpari, Post; Dahisar, Tal & Dist: Thane **(4000 MTA)**<br>12. **M/s. Green Valley E-waste Management Pvt. Ltd.,** Pritesh Complex, Bldg. No. A-7, Gala No 7, Anjurphata, Dapoda Road, Val: Vill: Val Tal Bhiwandi Dist: Thane **(240 MTA)**<br>13. **M/s. Indian Scrap Traders,** Ghusia Market, Gala no: 661 Vill: Pimpari, Post: Dahisar Dist: Thane. **(240 MTA)**<br>14. **M/s. Go-Green Recycling** Plot no. 32, Sec 1A , Service Industrial Area, Koparkhairne, Navi Mumbai **(240 MTA)**<br>15. **M/s. Hari International** Shree Parasnath Complex, Unit no. 6 Bldg no. D-4, Anjur Phata, Dapoda Road, Vill, Val, Tal: Bhiwnadi Dist: Thane **(240 MTA)**<br>16. **M/s. Suritex Pvt. Ltd.,** Plot No. B-111, MIDC Butibori, Dist, Nagpur **(360 MTA)**<br>17. **M/s. R. T. Corporation** S. No. 377, Hissar No: 2, Ambisi Ganeshpuri Road, Village: Palsai, Tal: Wada, Dist: Thane **(7500 MTA)** |

| Sl. No | State | Number of Registration Recycler | Name & Address<br>Capacity in Metric Ton per Annum (MTA) |
|---|---|---|---|
| | | | 18. **M/s. Aqsa Stamping,** Plot No. 55, Rangara Industrial Estate, 33/35, Kiruli, Old Thane-Pune road, Tal. Panvel, Dist. Raigad. **(500 MTA)**<br>19. **M/s. Mahalaxmi E-Recyclers Pvt. Ltd.,** Plot No. J-5, (part), Gokul Shirgaon MIDC Area Dist: Kolhapaur **(720 MTA)**<br>20. **M/s. V. M. Traders,** No: 296 (2), At Kondgaon, Post: Sakhrapa Tal: Sangmeshwar Dist: Ratnagiri **(10 MTA)**<br>21. **M/s. Green IT Recycling Center Pvt. Ltd.,** D-222, MIDC Ranjangaon, Tal. Shirur, Distt. Pune **(500 MTA)**<br>22. **M/s. Environcare Recycling Pvt. Ltd.,** Unit No. 8/C-1, Actual Indusrial complex, Uchat Road, Vill. Nagothane, Tal. Wada, Distt. Thane **(7500 MTA)**<br>23. **M/s. Shree Mohantara Solutions,** G. No. 1290, 10th Mile Pune-Satara Road, Wadki, Tal. Haveli, Distt. Pune **(450 MTA)**<br>24. **M/s. Anand Computer Systems**, 2160 B, Sadashiv Peth, Swamipuram Building Shop No. 7, 8, 9 Pune **(500 MTA)**<br>25. **E-Waste Recycling, Nicholas Compound,** Near Agarwal Naka, Sativali Road, Valiv, Vasai, Distt. Thane. **(500 MTA)**<br>26. **M/s. Krishna Metal Refinery, (Unit-2)** Plot No. 2/143, Sapronde Vill., Tal. Wada Distt. Thane. **(750 MTA)**<br>27. **M/s. R. K. E-Recycling International LLP,** Gala No. 2, Tirupati Industrial Park,, Sativali Road, Waliv, Tal. Vasai, Distt. Thane **(300 MTA)**<br>28. **M/s. Eco Recycling Limited** Eco House, Near Top Glass Enclave, Bhoipara Vasai (East) dist, Thane **(7200 MTA)**<br>29. **M/s. ECO Friend Industrial,** Plot No. A-205, TTC Industrial Area, MIDC Pawane, Navi Mumbai- 400710 **(240 MTA)**<br>30. **M/s. Evergreen Recyclekaro (I) Pvt. Ltd.,** S. No. 63/4, Vill: Varle, Tal: Wada, Dist: Thane **(2400 MTA)**<br>31. **M/s. E-incarnation Recycling Pvt. Ltd.,** Plot No. J-56, MIDC Tarapur, Dist: Thane **(3000 MTA)**<br>32. **M/s. Ecocentric Management Pvt. Ltd.,** Universal Industrial Estate, Sajgaon, Tal. Khalapur, Distt. Raigad **(2500 MTA)**<br>**(Total Capacity - 47810 MTA)** |
| 6. | **Madhya Pradesh** | **3 Unit** | 1. **M/s. Unique Echo Recycle**, Plot No. 26, Industrial Area, Palda, Indore (MP) **(6000 MTA)**<br>2. **M/s. Hostech Eco Management Pvt. Ltd.,** Plot No. 27, Sector-C, Sanwer Road, Indore (M.P.) **(585 MTA)**<br>3. **M/s Green Earth Recycling,** Plot No. 29C, Semi Urban industrial Area, Bhind (**2400 MTA**)<br>**(Total Capacity - 8985 MTA)** |

| Sl. No | State | Number of Registration Recycler | Name & Address<br>Capacity in Metric Ton per Annum (MTA) |
|---|---|---|---|
| 7. | **Orissa** | **1 Unit** | 1 **M/s. Sani Clean Pvt. Ltd.,** 401, N4-42 F, IRC Village, Bhubaneswar – 751015 **(Information on capacity not available at CPCB)** |
| 8. | **Punjab** | **1 Unit** | 1. **M/s. Ramky Enviro Engineers Ltd.,** Vill Nimbuan, Tehsil Dera Bassi, Distt. SAS Nagar **(Total Capacity – 150 MTA)** |
| 9. | **Rajasthan** | **10 Unit** | 1. **M/s. Green Escape Eco Management Pvt. Ltd.**, Unit – I, H-1-472, MIA, Alwar, Rajasthan-301030 **(450 MTA)**<br>2. **M/s Greenscape Eco Management Pvt Ltd**, Unit – II F-588to 591 MIA, Alwar, Rajasthan **(60,000 MTA)**<br>3. **M/s K.G. Metalloys**, F-- 37-38, RIICO Industrial Area, Ondela Road, Dholpur, Rajasthan – 328 001 **(1800 MTA)**<br>4. **M/s. Deshwal E-waste Recycler**, G-147A, IID, Khuskhera, Tehsil Tijara, Distt. Alwar (**750 MTA)**<br>5. **M/s. Green Leaf Recycling Industries**, G-166-167 West part RIICO Industrial Area, Bagru (Ext.) The Sanganer Distt Jaipur **(1380 MTA)**<br>6. **M/s. ETCO E-Waste Recycler Pvt.Ltd.,** D-117 1st Floor Ambabari, Jaipur **(750 MTA)**<br>7. **M/s. Vasoo Metals (Division-III),** G-287, M. I. A. Industrial Area, Alwar-301001 **(750 MTA)**<br>8. **M/s. R.P. Industries**, B-81(B), RIICO Growth Centre, Odela Road, Near Bhole Baba Dairy, Dholpur – 328001 **( 714 MTA)**<br>9. **M/s. S.B.J. & Co.,** F-137, Growth Center, RIICO Distt. Dholpur **(876 MTA)**<br>10. **M/s. Shukla E-Waste Processors**, B-81, RIICO Industrial Area, Bhiwadi, Tijara, Alwar. **(1200 MTA)**<br>**(Total Capacity- 68670 MTA)** |
| 10. | **Tamil Nadu** | **14 Unit** | 1. **M/s Trishyiraya Recycling India Pvt. Ltd.,** Plot No.A-7, Phase-I, MEPZ-SEZ, Tambaram, Chennai-600 045 **(740 MTA)**<br>2. **M/s. TES AMM Private Limited,** Plot No.A-18, SIPCOT Industrial Growth, Centre Oragadam, Panruti 'A' Village, Sriperumpudur, Kanchipuram District Tamil Nadu – 630 304 **(30000 MTA)**<br>3. **M/s Victory Recovery & Recycle Technologies India Pvt.Ltd.,** 672/2, Doubal Dragon Industrial Park, Kannur Village & Post Kottaiyur, Thiruvallur, District - Tamil Nadu - 602 108 **(6000 MTA)**<br>4. **M/s Ultrust Solutions (India)Pvt.Ltd.,** S.F.No.297/1B, Pappankuppam, Village : Gummidipoondi Taluk, Thiruvallur District, Tamil Nadu **(15000 MTA)**<br>5. **M/s INAA Enterprises, Plot No.**AC31/24, SIDCO Industrial Estate, Thirumudivakkam, Sriperumpudur, Taluk, Chennai-600 044 **(300 MTA)**<br>6. **M/s. AER world wide (India) Pvt. Limited**, 774, Elandhancheri, Sadayan Kuppam, village, Manali New Town, Thiruvallur Distict.<br>**(Information on capacity is not available at CPCB)** |

| Sl. No | State | Number of Registration Recycler | Name & Address<br>Capacity in Metric Ton per Annum (MTA) |
|---|---|---|---|
| | | | 7. **M/s. SEZ Recyclers,** Acenue, Mahindra World City Develpers Ltd., Industrial Park, Thenmelpakkam, Kancheepuram District.<br>**(Information on capacity is not available at CPCB)**<br>8. **M/s. Tritech Systems,** Porur Village, Ambattur Taluk, Thiruvallur Distirct<br>**(Information on capacity is not available at CPCB)**<br>9. **M/s. Shri Raaam Recycling,** SIDCO Industrial Estate, Gummidipoondi, Tiruvallur Taluk & Tiruvallur Distirict<br>**(Information on capacity is not available at CPCB)**<br>10. **M/s. Green R2 Re-Processors Pvt. Ltd.,** plot No. 19, TASS Industrial Estate, Ambattur, Chennai- 98<br>**(Information on capacity is not available at CPCB)**<br>11. **M/s. Abishek Enterprises.,** Ambattur Village & Taluk, Thiruvallur Dt,<br>**(Information on capacity is not available at CPCB)**<br>12. **13.M/s. B.V. Enterprises.,** S.F.No 42/1, Perambakkam Road, Thandalam Village, Sriperambatur Taluk, Kancheepuram District<br>**(Information on capacity is not available at CPCB)**<br>13. **14.M/s. Leela Traders.,** S.F.No41/1, Part Gudalore Village, Chengalpattu Taluk, Kancheepuram Dt.<br>**(Information on capacity is not available at CPCB)**<br>14. **15.M/s. GEMS Recycling Pvt. Ltd.,** S. F. No. 222-3, Plot No. 147/A, Neervalur Village, Kancheepuram Taluk & Ditt.<br>**(387 MTA)**<br>**(Total Capacity - 52427 MTA)** |
| 11. | **Telangana** | **04 Unit** | 1. **M/s. Earth Sense recycle Private Limited,** Plot No. 37,APIIC Industrial Park, Mankhal, Maheshwaram Mandal, Rangareddy District - AP **(1,800 MTA)**<br>2. **M/s Ramky E- Waste Recycling** Facility (Ramky Enviro Engineers Ltd) , Plot No. 25 A, Hardware Park, K. Raviryal (V), Maheshwaram (M), R.R. Dist - 500081 **(10,000 MTA)**<br>3. **M/s. Z Enviro Industries Pvt. Ltd.,** Pulimamidi (V), Kandukur (M), Rangareddy District.<br>4. **M/s. Envrio Collection Centre (Dismantling Unit),** Plot No. 1-185/2/A, Sy. No. 298 Part, Phase-I, IDA, Jeddimetla, Rangareddy District.<br>**Total = 11, 800 MTA** |
| 12. | **Uttar Pradesh** | **22 Unit** | 1. **M/s. Auctus – E Recycling Solutions Pvt. Ltd.,** F-637, M. G. Road, Industrial Area, Ghaziabad **(1800 MTA)**<br>2. **Mahaluxmi metal Alloys (India) Pvt. Ltd.,** Modinagar, Ghaziabad **(600 MTA)**<br>3. **M/s. N.K. Products,** 58-59, M. G. Road, Ghaziabad **(9000 MTA)**<br>4. **M/s Bharat Oil Co.**E-18, Site – IV, Sahibabad, Industrial Area, Ghaziabad **(4000 MTA)**<br>5. **M/s Plant Green Recycling Pvt. Limited, G-**129, Phase – I , M.G. Road, Ghaziabad **(1500 MTA)**<br>6. **Rocket Sales,** Plot No. 1-12, I/A, M. G. Road, Hapur **(300 MTA)**<br>7. **Arsh Recycling Pvt. Ltd.,** Plot No. 203, UPSDIC, I/A, M/G. Road, Ghaziabad **(9000 MTA)** |

| Sl. No | State | Number of Registration Recycler | Name & Address<br>Capacity in Metric Ton per Annum (MTA) |
|---|---|---|---|
| | | | 8. **Green Tech Ramen Pvt. Ltd.**, Plot No. B-2/12, Site-B, Surajpur, Industrial Area, Greater Noida **(9000 MTA)**<br>9. **M/s. Sims Recycling India Pvt. Ltd.**, S. D. F. J5-6, NSEZ Noida **(1000 MT/A)**<br>10. **Halcyon Electrotech Pvt. Ltd.**, Plot No. – 118, Udyog Kendra -2, Ecotech -3, Greater Noida **(660 MTA)**<br>11. **Intarvo Formulae Recyclers Services Pvt. Ltd.**, B-45, Sector-80, Phase-II, Noida **(7000 MTA)**<br>12. **M/s. TIC Group India Pvt. Ltd.**, J. 2& J-6, SDF, Block- 1, NSEZ, Noida **(1000 MTA)**<br>13. **Auctus Recycling Solutions Pvt. Ltd**, Habibpur, Greater Noida **(20000 MTA)**<br>14. **M/s. Khan Traders**, B-5, Site No. 4, Panki Ind. Area, Kanpur **(7190 MTA)**<br>15. **Green Tech Recycling**, Khasra No. 645, Acchraunds, Bahdurpur Road, Partapur, Meerut **(1800 MTA)**<br>16. **Narora Atomic Power** Station, Narora, Bulandshahar **(10 MTA)**<br>17. **M/s. E-Waste Recyclers India**, E-50, UPSIDC Industrial Area, 98Km Stone, NH-2, Kosi Kotwan, Mathura **(6000 MTA)**<br>18. **M/s. J. A. O. E-Waste Recycling Company**, Jaitpur, Kashipur Road, Moradabad **(300 MTA)**<br>19. **M/s. Oasis Eco E-Waste Recycling**, E- 160, UPSIDC, Ind. Area, Halilabad, Santkabirnagar Uttar Pradesh **(720 MTA)**<br>20. **M/s. Hin Green E-Waste Recycling Pvt. Ltd.**, B-19/1 Samar Garden, Meerut Uttar Pradesh **(750 MTA)**<br>21. **M/s. Hayat-E-Recyclers Pvt. Ltd., Plot No.** E-53& 54, M. G. Road Indl. Are, Hapur Uttar Pradesh **(3000 MTA)**<br>22. **M/s. Prakesh Metal House**, 39/223-224, Karwan, Alamganj, Loha Mandi, Agra Uttar Pradesh **(1500 MTA)**<br>**(Total Capacity - 86,130 MTA)** |
| 13. | **Uttarakhand** | **3 unit** | 1. **M/s. Attero Recycling Pvt. Ltd.**, 173, Village Bhagwanpur, Raipur Industrial Area, Roorkee, Dist. Haridwar, Uttarakhand **(12000 MTA)**<br>2. **M/s. Bharat Oil and Waste Management Ltd**. Mauza Mukimpur, Roorkee-Lakshar Road-Roorkee Dist. Haridwar- 247664 **(10000 MTA)**<br>3. **M/s. Resource E-Waste Solutions Pvt. Ltd.**, F-97 Industrial Area, Bhadrabad Dist Daridwar **(6000 MTA)**<br>**(Total Capacity - 28, 000 MTA)** |
| 14. | **West Bengal** | **1 Unit** | 1. **M/s. J.S. Pigments Pvt. Ltd.**, Vill. & P.O.- Jarura, P.S.- Polba, Dist. – Hooghly, Pin- 712138 **(600 MTA)** |
| **Total** | | **178 units** | **Total Capacity – 438085.62 MTA Approx.- 438086 MTA**<br>**Note:- Information on capacity of some of the units are not available at CPCB** |

# Annex 8: Comprehensive List of technical specifications for Room Air conditioners as a part of sustainable public procurement tender

| No. | Organizational criteria | Requirement for RAC manufacturers | Certification /submission needed |
|---|---|---|---|
| 1. | Hazardous substance management | The Environment (Protection) Rules, | Information on Rules is available on MoEFCC website.<br>The Acts and Rules made thereunder shall be read including all amendments till date.<br>The manufacturers shall produce necessary documentation for compliance with requirements of these Rules to the procuring agency.<br>The documentation process already in-exercise by the manufacturers for conforming the compliance with these regulations and/or as per the business-as-usual conditions shall be submitted. |
| | | Hazardous Waste (Management, Handling & Transboundary Movement) Rules, | |
| | | E- Waste (Management) Amendment Rules, | |
| | | Plastic Waste (Management and Handling) Rules, | |
| | | Solid Waste (Management) Rules | |
| | | The Plastics (Manufacture, Usage and Waste Management) Rules | |
| | | The Recycled Plastics Manufacture and Usage Rules, | |
| | | Batteries (Management and Handling) Rules | |
| | | The Manufacture, Storage and import of Hazardous Chemical Rules | |
| 2. | Noise pollution | The manufacturing facilities shall comply with the noise standards for industrial facilities, as specified within the provisions of the Act and Noise pollution (Regulation and Control) Rules. Additionally, all such facilities should take measures for the abatement of noise, including noise emanating from sound producing equipment or instruments, and should ensure that existing noise levels do not exceed ambient air quality standards specified. | Certification (self or third party) for compliance to be provided to the procuring agency |

| No. | Organizational criteria | Requirement for RAC manufacturers | Certification /submission needed |
|---|---|---|---|
| | | All planned developmental activity related to industrial manufacturing or distribution of manufactured products should take into consideration noise pollution aspects and should avoid noise menace.<br>The recommended ambient noise levels shall always be adhered to by cooling appliance manufacturing facilities. | |
| 3. | Ozone depletion | No manufacturing facility shall employ equipment that release ozone-depleting substances, and all existing equipment should be in the process of phasing out ozone-depleting substances. The complete list of ozone-depleting substances is specified on the website of the Ministry of Environment, Forests, and Climate Change, and includes CFCs, Halons, Carbon Tetrachloride, Methyl Chloroform, HCFCs, BFCs, HBFCs, and Methyl Bromide<br>No manufacturing facility shall export or import ozone-depleting substances, equipment, or instruments to any country.<br>No manufacturing facility or any associated person(s), shall sell, stock, or exhibit for local or international sale, any ozone depleting substance, equipment, or instrument.<br>No manufacturing facility or any associated person(s), shall establish, expand, or invest in, ozone-depleting substances, equipment, or instruments | Certification (self or third party) for compliance to be provided to the procuring agency |
| 4. | EMS certification | Compliance with ISO 14001 (EMS – Environmental Management System) | Third-party certification to be provided to the procuring agency |

| No. | Organizational criteria | Requirement for RAC manufacturers | Certification /submission needed |
|---|---|---|---|
| 2. | Corporate social responsibility | Comply with Corporate Social Responsibility Norms as per the Rules and Provisions under the Company Act and revised from time to time | Certification (self or third party) for compliance to be provided to the procuring agency |

| No. | Social criteria | Requirement for RAC manufacturers | Certification /submission needed |
|---|---|---|---|
| 1. | Labor law | Comply with the Indian Labor Law (for establishments in India) or International Labor Organization (for international establishments), as specified within the provisions of the various Rules and Regulations prepared from time to time | Certification (self or third party) for compliance to be provided to the procuring agency |
| 2. | Employee Wellbeing and Gender Inclusivity | Should have internal policies and guidelines to promote employee and staff wellbeing | Self-declaration |

| No. | Product criteria | Requirement for RAC manufacturers | Certification /submission needed |
|---|---|---|---|
| 1. | Product type | **Preferred:** Variable capacity (inverter type) air conditioners (unitary or split system as per the requirement) | Not applicable |
| 2. | Safety and performance | AC shall conform to the requirements for quality, safety and performance prescribed in **IS 1391 Part 2 titled Room Air Conditioners: Part 2 Split Air Conditioners Revised /IEC 60335-2-40** (under preparation) and all other requirements specified in this standard | Certification (BIS or third party – accredited test agency) for compliance to be provided to the procuring agency |
| 3. | Product noise | AC shall conform to the noise levels as specified under the standard issued by BIS **(IS 1391 Revised)** | Certification or report (third party – accredited test agency) for compliance to be provided to the procuring agency |
| 4. | Energy consumption | The ISEER shall be not less than the value prescribed for **XX-star level** as per norms specified by Bureau of Energy Efficiency (BEE) from time to time. | Approval letter from BEE for qualification of XX-star band and respective ISEER value |

| No. | Product criteria | Requirement for RAC manufacturers | Certification /submission needed |
|---|---|---|---|
| 5. | Refrigerant | Refrigerants which are ozone depleting and higher GWP as identified under Montreal Protocol and/or Kigali protocol shall not be used in the manufacture or import of these RACs.<br>The refrigerant should have **Zero ODP**. The Global warming potential **(GWP) not exceeding 700** (100 years)[25] is recommended till a specific directive is issued by MoEFCC | Certification (self or third party) for compliance to be provided to the procuring agency.<br>Alternatively, manufacturer's declaration conforming the information provided is as per BIS Standard on the RAC's rating plate shall be provided. |
| 6. | Recycled plastic components | Product shall be designed to promote recycling, which by means of supplying recycled plastic components at least **80% percent by weight** of plastic components in product | Certification (self or third party) for compliance and a self-declaration from the manufacturer to be provided to the procuring agency |
| 7. | Paints use | Paints used in the product shall not contain heavy metals or their compounds include mercury (Hg), lead (Pb), cadmium (Cd) and hexavalent chromium (Cr). | Certification (self or third party) for compliance to be provided to the procuring agency |
| 8. | Packaging | The air conditioner shall be packed in such packages, which are made of **recycled or biodegradable materials.**<br>Plastic packaging shall conform to testing requirements specified in the **BIS draft on ECO criteria, when available.** | Certification (self or third party) for compliance to be provided to the procuring agency |

[25] The GWP value is as per U4E AC Model Regulation Guidelines from UNEP and the EU criteria. The value considers allowable refrigerants as per IPCC Fifth Assessment Report, 2014. The EU market has a ban for GWP 750. The recommended criteria have been kept more ambitious in terms of allowable GWP value for refrigerants controlled under the Montreal Protocol. Also, in the recent market intervention initiative by EESL for launch of 7-star air conditioners, similar limit for allowable refrigerant has been considered.

# Annex 9: Green Room Air Conditioner Specifications for Govt. e-Market Place

GeM would like to introduce a category for "green products" starting with room air conditioners. The specifications for the "green air conditioner" are based on the SPP criteria outlined in partnership with UNEP. While we continue to work on efforts of SPP integration with GeM, this is a separate exercise that is focused on a separate product category, for those seeking "green air conditioners". Hence the following aspects have been considered while suggesting the specifications for "green air conditioner":

1. All specifications outlined under core and comprehensive criteria have been included from the SPP report. However, some of the comprehensive criteria have been included as qualitative measures.
2. Specifications related to energy consumption and refrigerants have been made more stringent based on the current market assessment and to promote a few innovative RAC manufacturers.

## Product Specifications (Room Air Conditioners till 2 TR cooling capacity)

All "Green Air Conditioners" will be variable speed (inverter)-based. Fixed speed RACs will not qualify.

| Product Specifications for Room Air Conditioners | |
|---|---|
| **Parameter** | **Specifications** |
| Safety and Performance | Air conditioner shall conform to the requirements for quality, safety and performance prescribed in IS 1391 Part 2 titled Room Air Conditioners: Part 2 Split Air Conditioners Revised /IEC 60335-2-40 (under preparation) and all other requirements specified in this standard. |
| Product Noise | Air conditioner shall conform to the noise levels specified under the standard issued by BIS (IS 1391 Revised). |
| Energy Consumption | The ISEER shall be not less than the value prescribed below as per norms specified by the Bureau of Energy Efficiency (BEE) from time to time.<br>• (1 to 1.49 TR) – ISEER 5.8<br>• (1.5-1.9 TR) – ISEER 5.4 |
| Refrigerants | The refrigerant should have Zero ODP.<br>The Global warming potential (GWP) not exceeding 700 (100 years)[12] is required until a specific directive is issued by MoEFCC. |
| Recycled Plastic Components | Product shall be designed to promote recycling, by utilising recyclable plastic components at least 80 percent by weight of plastic components in product[26] |
| Paint | Paints used in the product shall not contain heavy metals or their compounds include mercury (Hg), lead (Pb), cadmium (Cd) and hexavalent chromium (Cr). |
| Packaging | The air conditioner shall be packed in such packages, which are made of recycled or biodegradable materials. Plastic packaging shall not contain halogenated hydrocarbon. |

[26] Reference: Korea Eco-Label. Air Condition: Korea Environmental Industry & Technology Institute. 2011; and Thailand Environment Institute - Green Label Product: Room Air Conditioner (TGL- 7- R3 - 14)

| Product Specifications for Room Air Conditioners | |
|---|---|
| **Parameter** | **Specifications** |
| | Plastic packaging shall conform to testing requirements specified in the BIS draft on ECO criteria. |
| Green Clauses | Take-back or buy-back option is available with the manufacturer. |

| Organizational Specifications for RAC Manufacturers | |
|---|---|
| **Parameter** | **Specifications** |
| Hazardous substance management | The manufacturers should abide by the regulations listed under the Act regarding hazardous waste; including, not limited to, the following[27]:<br>• The Environment (Protection) Rules,<br>• Hazardous Waste (Management, Handling & Transboundary Movement) Rules,<br>• E-Waste (Management) Amendment Rules,<br>• Plastic Waste (Management and Handling) Rules,<br>• Solid Waste (Management) Rules<br>• The Plastics (Manufacture, Usage and Waste Management) Rules<br>• The Recycled Plastics Manufacture and Usage Rules,<br>• Batteries (Management and Handling) Rules<br>• The Manufacture, Storage and Import of Hazardous Chemical Rules.<br>The Acts and Rules made thereabove shall be read including all amendments to date. |
| Noise Pollution | The manufacturing facilities shall comply with the noise standards for industrial facilities, as specified within the provisions of the Act and Noise pollution (Regulation and Control) Rules. Additionally, all such facilities should take measures for the abatement of noise, including noise emanating from the sound producing equipment or instruments, and should ensure that existing noise levels do not exceed ambient air quality standards specified.<br>All planned developmental activity related to industrial manufacturing or distribution of manufactured products should take into consideration noise pollution aspects and should avoid noise menace.<br>The recommended ambient noise levels shall always be adhered to by cooling appliance manufacturing facilities. |
| Ozone Depletion | The complete list of ozone-depleting substances is specified on the website of the Ministry of Environment, Forests, and Climate Change (MoEFCC), and includes CFCs, Halons, Carbon Tetrachloride, Methyl Chloroform, HCFCs, BFCs, HBFCs, and Methyl Bromide.<br>No manufacturing facility shall employ equipment that releases ozone depleting substances, and all existing equipment should be in the process of phasing out ozone-depleting substances.<br>No manufacturing facility shall export or import ozone-depleting substances, equipment, or instruments to any country.<br>No manufacturing facility or any associated person(s), shall sell, stock, or exhibit for local or international sales, any ozone-depleting substance, equipment, or instrument. |

[27] Information on Rules is available on MoEFCC website. The Acts and Rules made thereunder shall be read including all amendments till date.

| Organizational Specifications for RAC Manufacturers | |
|---|---|
| **Parameter** | **Specifications** |
| | No manufacturing facility or any associated person(s), shall establish, expand, or invest in, ozone-depleting substances, equipment, or instruments. |
| Environmental Management System (EMS) Certification | Compliance with ISO 14001 (EMS – Environmental Management System) |
| Corporate Social Responsibility | Comply with Corporate Social Responsibility Norms as per the Rules and Provisions under the Company Act and revised from time to time. |
| Labour Laws | Comply with the Indian Labour Law (for establishments in India) or International Labour Organization (for international establishments), as specified within the provisions of the various Rules and Regulations prepared from time to time. |
| Employee Well-being and Gender Inclusivity | Should have internal policies and guidelines to promote employee and staff wellbeing. |

## Draft specifications for AC Manufacturers based on parameters requested on the GeM portal

**Conformity / Certification**

| | | |
|---|---|---|
| BEE Star Rating | **5** | |
| Conformity to Indian Standard | **IS 1391 latest** | |

**Capacity / Generic**

| | | |
|---|---|---|
| Type of Air conditioner | As per buyer requirement | |
| Technology of AC | **Inverter (Variable Speed)** | |
| Nominal cooling capacity in Ton / (kcal/hr) | 1 Ton / 1.5 Ton | |
| **ISEER** | **Based on capacity (ISEER specs to be confirmed)** | **New parameter to be added on GeM portal.** |
| Coil Material | As per buyer requirement | |
| Eco-friendly refrigerant | **Yes** | |
| **Type of refrigerant** | **Selection based on GWP and ODP values of refrigerants.** | **New parameter to be added on GeM portal.** |
| Minimum length of copper pipe and suitable connecting electrical cable for installation and commissioning | As per buyer requirement | |
| Packing List | As per buyer requirement | |
| Any other Features | As per buyer requirement | |

**Warranty**

| | | |
|---|---|---|
| Warranty on Machine | As per buyer requirement | |
| Warranty on Compressor | As per buyer requirement | |

**Installation**

| | | |
|---|---|---|
| Installation and commissioning | As per buyer requirement | |

# Annex 10: European Union Core and Comprehensive GPP criteria for paper

Table 1. Selected Important Core GPP criteria for copying and graphic paper for normal office use and for professional purposes. European Commission Green Public Procurement (GPP) Training Toolkit. 2008. Available online: https://ec.europa.eu/environment/gpp/pdf/toolkit/paper_GPP_background_report.pdf

| **Copying and graphic paper for normal office use** | **Paper for professional use** |
|---|---|
| Subject Matter | |
| Purchase of recycled office paper made from 100% recovered paper fibers | Purchase of recycled office paper made from at least 75% recovered paper fibers |
| • Paper must be made from 100% recovered paper fibers. Recovered paper fibers include both post-consumer recycled fibers and pre-consumer recycled fibers from paper mills, also known as broke. Post-consumer recycled fibers may come from consumers, offices, printing houses, bookbinders, or similar.<br>• The paper must be at least Elementary Chlorine Free (ECF). Totally Chlorine Free (TCF) will also be accepted.<br>• In order to guarantee the suitability of the paper offered for office machines, a sample of the product must be provided to the authority to conduct quality tests. | • Paper must be made from at least 75% recovered paper fibers. Recovered paper fibers include both post-consumer recycled fibers and pre-consumer recycled fibers from paper mills, also known as broke. Post-consumer recycled fibers may come from consumers, offices, printing houses, bookbinders, or similar.<br>• The paper must be at least Elementary Chlorine Free (ECF). Totally Chlorine Free (TCF) will also be accepted.<br>• In order to guarantee the suitability of the paper offered for office machines, a sample of the product must be provided to the authority to conduct quality tests. |
| Subject Matter | |
| Purchase of office paper based on virgin fibre stemming from legally and/or sustainably harvested sources (also potentially containing a percentage of recovered fibers) | |
| • The virgin fibre for pulp production shall come from legal sources.<br>• The paper must be at least Elementary Chlorine Free (ECF).<br>• Sustainable forestry sources (additional points will be awarded) | • The virgin fibre for pulp production shall come from legal sources.<br>• The paper must be at least Elementary Chlorine Free (ECF).<br>• Sustainable forestry sources (additional points will be awarded) |

https://ec.europa.eu/environment/gpp/pdf/toolkit/paper_GPP_product_sheet.pdf

Table 2. Important Comprehensive GPP criteria for copying and graphic paper for normal office use and for professional purposes (European Commission Green Public Procurement (GPP) Training Toolkit. 2008. Available online: https://ec.europa.eu/environment/gpp/pdf/toolkit/paper_GPP_background_report.pdf https://ec.europa.eu/environment/gpp/pdf/toolkit/paper_GPP_product_sheet.pdf

| **Copying and graphic paper for normal office use** | **Paper for professional use** |
|---|---|
| Subject Matter | |

| Purchase of recycled office paper made from 100% recovered paper fibers | Purchase of recycled office paper made from 75% recovered paper fibers |
|---|---|
| • Paper must be made from 100% recovered paper fibers, with a minimum of 65% post-consumer recycled fibers. Recovered paper fibers include both post-consumer recycled fibers and pre-consumer recycled fibers from paper mills, also known as broke. Post-consumer recycled fibers may come from consumers, offices, printing houses, bookbinders, or similar.<br>• The ecological criteria of the EU Ecolabel, or other type I national ecolabels directly related to paper production (and not the management practices of the factory) must be met.<br>• In order to guarantee the suitability of the paper offered for office machines, a sample of the product must be provided to the authority to conduct quality tests. | • Paper must be made at least from 75% recovered paper fibers, with a minimum of 80% post-consumer recycled fibers. Recovered paper fibers include both post-consumer recycled fibers and pre-consumer recycled fibers from paper mills, also known as broke. Post-consumer recycled fibers may come from consumers, offices, printing houses, bookbinders, or similar.<br>• The ecological criteria of the EU Ecolabel, or other type I national ecolabels directly related to paper production (and not the management practices of the factory) must be met.<br>• In order to guarantee the suitability of the paper offered for office machines, a sample of the product must be provided to the authority to conduct quality tests. |
| Subject Matter | |
| Purchase of office paper based on virgin fibre stemming from legally and/or sustainably harvested sources (also potentially containing a percentage of recovered fibers) | |
| • The virgin fibre for pulp production shall come from legal sources.<br>• The paper must be at least Elementary Chlorine Free (ECF). Totally Chlorine Free (TCF) will also be accepted.<br>Additional points for: Sustainable forestry sources & Ecolabel criteria | |

# Annex 11: European Union GPP criteria and technical specifications for cleaning products and services

***Following Selection criteria (SC), Award Criteria (AC), technical specifications (TS) and Contract Performance Clauses (CPC) taken from: European Commission. 2018. EU GPP criteria for indoor cleaning services. Available online:***
https://ec.europa.eu/environment/gpp/pdf/tbr/181113_jrc113795_gpp_cleaning_services_tr_final.pdf
https://ec.europa.eu/environment/gpp/pdf/toolkit/cleaning_product/en.pdf

SC1 - ***Competences of the tenderer*** (Cleaning services)

- The tenderer must have relevant competences and experience in providing environmentally conscious indoor cleaning services that, at a minimum, included the following: use of cleaning products that have been awarded an Ecolabel for hard surface cleaning or other relevant type I ecolabels that are nationally or regionally officially recognised in the Member States for at least 50 % of the cleaning tasks in a contract, staff training by internal or external trainers, that covers environmental aspects such as correct cleaning product dilution and dosage use, discarding of wastewater and waste sorting.

TS1.1 - ***Use of ecolabelled cleaning products*** (Cleaning products) → TS
The use of ecolabelled cleaning products by the cleaning service sector provides a reliable way of identifying more environmentally friendly cleaning products, as ISO Type I ecolabels put strict limitations on the chemical composition and formulations of products.

- Option A (easier to verify during contract execution) The following types of cleaning products [list of cleaning products to be defined by the contracting authority — for instance all purpose cleaners, sanitary cleaners] to be used to perform tasks related to the contract must be compliant with criterion 1 and criterion 4 of the EU Ecolabel for hard surface cleaning products on, respectively, toxicity to aquatic organisms and excluded or restricted substances.

- Option B (more complex to verify during contract execution) At least A%) of all cleaning products, by volume at purchase, to be used to perform tasks related to the contract must be compliant with criterion 1 on toxicity to aquatic organisms and criterion 4 on excluded and restricted substances of the EU Ecolabel for hard surface cleaning products.

- All cleaning products to be used to perform tasks related to the contract must be compliant with criterion 1 and criterion 4 of the EU Ecolabel for hard surface cleaning products on, respectively, toxicity to aquatic organisms and excluded or restricted substances.

AC1.1 - ***Use of ecolabelled cleaning products*** (Cleaning products)

- Only applicable in relation to TS 1.1 — Option B Points will be awarded proportionally to tenders in which more than A%) of all cleaning products, by volume at purchase, to be used to perform tasks related to the contract must be compliant with criterion 1 and criterion 4 of

the EU Ecolabel for hard surface cleaning products on, respectively, toxicity to aquatic organisms and excluded or restricted substances.

TS1.2 - ***Use of concentrated undiluted cleaning products*** *(Cleaning products)*

This criterion aims to promote the use of products that require dilution with water before use. Evidence shows that the use of undiluted products results in reduced emissions due to lower packaging material requirements and fuel use for transportation. In addition, lower amounts of resources are used to manufacture these products, resulting in lower impacts (AISE, 2013).

- Option A (easier to verify during contract execution) The following cleaning products [list of cleaning products to be defined by the contracting authority — for instance all purpose cleaners, sanitary cleaners] to be used to perform tasks related to the contract must have a minimum dilution rate of 1:80.

- Option B (more complex to verify during contract execution) At least B%) of all cleaning products, by volume at purchase, to be used to perform tasks related to the contract must have a minimum dilution rate of 1:80.

AC1.2 - ***Use of concentrated undiluted cleaning products*** *(Cleaning products)*

- Points will be awarded to tenders proportionally to the percentage of all cleaning products, by volume at purchase, to be used to perform tasks related to the contract with a minimum dilution rate of 1:80.

TS2.1 - ***Use of microfiber products*** *(Cleaning accessories)*

The benefits of using microfiber products in cleaning activities have been demonstrated through multiple studies (e.g. (EPA, 2002) (UNEP, 2008)). For example, it was found that the use of microfiber can result in a 95% reduction in water and chemical use, a 20% reduction in labour costs per day and a 60% reduction in cost over the lifetime of a mop (UNEP, 2008). The same study also showed that the use of microfiber mops might reduce costs associated with worker injuries as microfiber mops are much lighter than conventional mops and they require less cleaning solution, reducing the need to repeatedly lift heavy buckets of water. **BUT**: While the benefits of using microfiber products are well known, new studies show that the laundering of microfibers can contribute to marine pollution. Indeed, microplastics are released during washing of synthetic fibre and current waste treatment systems have not been designed to catch them before they are released into the marine environment (Boucher & Friot, 2017).

- At least C% of all textile cleaning accessories (e.g. cloths, mop heads) to be used to perform tasks related to the contract must be made of microfiber. Product maintenance should be supported by the product technical data sheet that indicates product use and washing instructions.

- All textile cleaning accessories (e.g. cloths, mop heads) to be used to perform tasks related to the contract must be made of microfiber or meet the requirements set out in the EU Ecolabel for textile products Product maintenance should be supported by the product technical data sheet that indicates product use and washing instructions

- All textile cleaning accessories (e.g. cloths, mop heads) to be used to perform tasks related to the contract must be made of microfiber or meet the requirements set out in the EU

Ecolabel for textile products. Product maintenance should be supported by the product technical data sheet that indicates product use and washing instructions.

AC2.1 - ***Use of microfiber products*** *(Cleaning accessories)*

- Points will be awarded proportionally to tenders in which more than C% of all textile cleaning accessories (e.g. cloths, mop heads) to be used to perform tasks related to the contract must be made of microfiber. Product maintenance should be supported by the product technical data sheet that indicates product use and washing instructions.

TS2.2 - ***Use of ecolabelled cleaning accessories*** *(Cleaning accessories)*

The use of cleaning accessories was identified as an environmental hotspot for cleaning services by ADEME (2010), and the use of ecolabelled cleaning accessories can provide a reliable way of lowering impacts associated with cleaning services.

- At least D% of all textile cleaning accessories (e.g. cloths, mop heads) to be used to perform tasks related to the contract must meet the technical requirements set out in the EU Ecolabel for textile products. Product maintenance should be supported by the product technical data sheet that indicates product use and washing instructions.

AC2.2 - ***Use of ecolabelled cleaning accessories*** *(Cleaning accessories)*

- → AC: Points will be awarded proportionally to tenders in which a percentage of all textile cleaning accessories (e.g., cloths, mop heads) to be used to perform tasks related to the contract meet the technical requirements set out in the EU Ecolabel for textile products. Product maintenance should be supported by the product technical data sheet that indicates product use and washing instructions.

- → AC: Points will be awarded proportionally to tenders in which more than D% of all textile cleaning accessories (e.g., cloths, mop heads) to be used to perform tasks related to the contract meet the technical requirements set out in the EU Ecolabel for textile products. Product maintenance should be supported by the product technical data sheet that indicates product use and washing instructions.

TS3 - ***Environmental management measures and practices*** *(Cleaning services)*

In order to ensure the good environmental performance of a contract, it is proposed to include criteria requiring companies to set up a basic environmental management system in order to monitor and establish that their environmental performance improves over time.

- monitor and record the indicators that must be specified in the tender. The minimum monitoring frequency required must be at least once every 4 months for a representative day

- minimise the environmental impacts associated with the indicators monitored and recorded in 1, towards a defined target.

- evaluate the implementation of points 1 and 2 by tracking any change in the indicators and the implementation of the procedures.in case of deviations, implement the necessary actions to correct those deviations, and if possible, prevent them in the future.

- produce an annual report on the changes of these indicators.

AC3 - ***Environmental management measures and practices*** *(Cleaning services)*

- Points will be awarded in proportion to the quality of the environmental management system that tenderers commit to put in place to perform the contract.

TS4.1, TS4.2, TS4.3 - ***Consumable goods*** *(Consumable goods)*

Consumable goods are not used by cleaning companies as part of their cleaning activities but, in some cases, they can be procured and supplied by these companies on behalf of their clients as part of tenders. The consumer goods covered under this criterion include the most commonly procured products (hand soap, textile towels and tissue paper products).

- Hand soap: At least E% of all hand soap, by volume at purchase, to be provided to the contracting authority by the tenderer as part of the contract must meet the technical requirements of the EU Ecolabel for rinse-off cosmetic products

- Textile towels: At least F of all textile towel rolls, expressed in number of rolls, to be provided to the contracting authority by the tenderer as part of the contract must be compliant with the technical requirements of the EU Ecolabel for textile products.

- Tissue paper products: All tissue paper goods to be provided to the contracting authority by the tenderer as part of the contract must be compliant with the requirements of [an EN ISO 14024 type I ecolabel to be determined by the contracting authority].

AC4 - ***Energy efficiency of vacuum cleaners*** *(Cleaning services)*

Vacuum cleaners are the most frequently used pieces of energy-powered equipment in the cleaning service sector and energy consumption linked to vacuum cleaners has been identified as an environmental hotspot (ADEME, 2010; Consorcio Soligena, 2011). Depending on the cleaning situation, the energy consumption of floor cleaning, to which vacuum cleaners are a major contributor, can account for up to 52% of the total energy consumption for cleaning services.

- Points will be awarded proportionally to tenders in which a percentage of all vacuum cleaners to be used to perform tasks related to the contract meet, at the time of purchase, at least the following energy efficiency classes as laid down in Commission Delegated Regulation (EU) No 665/2013, at the time of purchase: Class A for vacuum cleaners bought before 01/09/2017 Class A+ for vacuum cleaners bought after 01/09/2017

CPC1.1 - ***Cleaning products and accessories used*** *(Cleaning products Cleaning accessories)*

- For the duration of the contract, the contractor must document and report the following aspects at least twice a year to the contracting authority:

    - 1. Type, dilution rate and volume at purchase of cleaning products used to deliver the cleaning services, indicating which products meet the requirements set in TS1.1, TS1.2, AC1.1 or AC1.2, as appropriate.

- 2. Type and quantity of cleaning accessories used to deliver the cleaning services, indicating which products meet the requirements set in TS2.1, TS2.2, AC2.1 or AC2.2, as appropriate.

- The contracting authority may set rules for applying penalties for non-compliance.

CPC1.2 - ***Cleaning product dosing*** *(Cleaning products)*

The importance of correct cleaning product dosing is linked to the fact that overdosing can greatly increase the environmental impacts linked to cleaning services as it leads to a greater chemical load for each task.

- The contractor must make available to the cleaning staff the appropriate dosing and diluting apparatus for the cleaning products used (e.g. automatic dispensers, measuring beakers/caps, hand pumps, sprays) and make available the corresponding instructions for correct dosing and diluting, either at the cleaning site or at the contractor's premises, as appropriate.

- The contracting authority may set rules for applying penalties for non-compliance

CPC2 - ***Staff training*** *(Cleaning services)*

Cleaning company staff plays an important role in the delivery of cleaning service as their practices influence the final environmental footprint of the contract. This CPC aims to ensure that cleaning staff are trained to deliver efficient and effective cleaning services in order to benefit to the maximum from the environmentally preferable products and practices.

- For the duration of the contract, the contractor must have in place an internal staff training programme or provide staff with the means to participate in an external training programme that covers the topics listed below, where they are pertinent to the tasks performed by the staff member, as part of the contract:

    - Cleaning products

    - Energy saving

    - Water saving

    - Waste

    - Health and Safety

The contractor must ensure that all new staff (permanent and temporary staff) performing cleaning tasks as part of the contract receive adequate training within 6 weeks of starting employment. All staff performing tasks as part of the contract must be given an update on all the aspects outlined in the criterion at least once a year.

CPC3 - ***Environmental management measures and practices*** *(Cleaning services)*

- The contractor must document and report, over the contract duration:
  - the results of the monitoring of indicators and
  - the results of the evaluation and the correction and prevention actions, where applicable, according to the written procedures provided for to verify the TS3.

- These reports must be made available to the contracting authority for verification purposes. The contracting authority may set rules for applying penalties for non-compliance.

CPC4 - ***Consumable goods*** *(Consumable goods)*

- For the duration of the contract, the contractor must document and report at least twice a year to the contracting authority the type and quantity of consumable goods provided as part of TS4.1, TS4.2 and TS4.3, as applicable. The contracting authority may set rules for applying penalties for non-compliance.

CPC5 - ***Purchase of new vacuum cleaners*** *(Cleaning services)*

- All new vacuum cleaners purchased by the contractor to perform tasks related to the contract must meet class A+ or higher on energy efficiency as defined in Commission Delegated Regulation (EU) No 665/2013, at the time of purchase.
- The contractor must report the purchase of new vacuum cleaners to the contracting authority. The contracting authority may set rules for applying penalties for non-compliance.

# Annex 12: List of participants during the Expert Consultation on SPP Criteria for Writing and Printing Paper held on 15th February 2021

| Organization | Name | Designation |
|---|---|---|
| Procurement Policy Division, Department of Expenditure, Ministry of Finance | Sanjay Aggarwal | Advisor |
| Procurement Policy Division, Department of Expenditure, Ministry of Finance | Kanwalpreet Singh | Director |
| Ministry of Railways | M.K. Gupta | EDRS/G |
| GeM | Prakash Mirani | ACEO |
| GeM | Dharnidhar Jha | Deputy CEO |
| GeM | Bholenath Vishwakarma | Environmental and Sustainability Consultant |
| CPPRI | Nitin Endlay | Scientist E-II |
| BIS | Shrishti Dixit | Scientist-E |
| TNPL | Dr. Sangralingam | Sr. Manager, QC |
| NCCF | A.K. Srivastava | Director General |
| NCCF | Varun Grover | Asst. Director |
| NCCF | Ria Antil | |
| IPMA | Neehar Aggarwal | Representative for IPMA and Chief Operating officer for BILT |
| IARPMA | Jaiprakash T | Joint Secretary |
| IARPMA | Dr. Bipin Thapliyal | Ex. Director, CPPRI |
| JK Paper Limited | Raghvendra Hebbar | Project Development |
| ITC | Rakesh Sachhar | VP, Sales |
| WCPM | Anil Patel | |
| CII | Nandini Kumar | Consultant |
| Environmental Design Solution (EDS)-MAITREE | Tanmay Tathagat | Director |
| Environmental Design Solution (EDS)-MAITREE | Nidhi Gupta | |
| UNEP | Atul Bagai | Country Head |
| UNEP | Farid Yaker | Programme Officer |
| UNEP | Divya Datt | Programme Management Officer |
| UNEP | Vikram Rajvanshi | SPP-Consultant |

# Annex 13: List of participants during the Expert Consultation on SPP Criteria for Room Air Conditioners held on 7th January 2021

| Organization | Name | Designation |
|---|---|---|
| Procurement Policy Division, Department of Expenditure, Ministry of Finance | Sanjay Aggarwal | Advisor |
| GeM | Prakash Mirani | JS & ACEO |
| GeM | Bholenath Vishwakarma | Environmental and Sustainability Consultant |
| BIS | Khushbu Jyotsna kindo | Scientist-C |
| BEE | Deepshika Wadhwa | Project Engineer |
| Ozone Cell | Prof. R.S. Agarwal | Senior Advisor |
| Ozone Cell | Chanchal Sharma | |
| Bluestar | Bhupesh Balakrishnan | |
| Carrier | Dhiraj Wadhwa | Director |
| Carrier | Sanjay Sharma | |
| Voltas | Srinivasu Moturi | Sr. General Manager, Voltas R&D Center |
| Voltas | Harish Duseja | |
| CEAMA | Srinivasu Moturi | Council Chairman-BEE, BIS Ozone Cell, CEAMA |
| Hitachi | Piyush Gupta | General Manager-Head International Sales |
| Hitachi | Tarun Asthana | |
| Daikin | Gaurav Mehtani | |