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Sustainable Public Procurement in India: Selection of priority products and Preliminary Market Assessment

23 December 2019

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List of Abbreviations

APEOs	-	Alkylphenolethoxylates
BEE	-	Bureau of Energy Efficiency
BIS	-	Bureau of Indian Standards
CFCs	-	Chlorofluorocarbons
CII	-	Confederation of Indian Industry
ECF	-	Elemental Chlorine Free
EDTA	-	Ethylenediaminetetraacetic acid
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 tonnes per annum
NCCF	-	Network for Certification and Conservation of Forests
NTA	-	Nitrilotriacetic acid
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
VOC	-	Volatile Organic Compounds

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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 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 (UNEP, 2015).

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 more 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 its 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 and water consumption but also limits energy 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 Thirteenth Finance Commission of India emphasized the need for India to grow with a lower environmental and resource footprint than at present. The Government of India also 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 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) 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.[1]

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 key issues anticipated as guidelines were developed.[2]

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.[3]

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 procurement officers should be empowered to buy on life-cycle cost basis".[4] In 2017, NITI Aayog published a Strategy Paper on Resource Efficiency in India which includes an action plan for

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

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.[5] 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[6]. An analysis of the gaps in this study will help advance towards the next stage and finalise the products, as also the sustainability criteria.

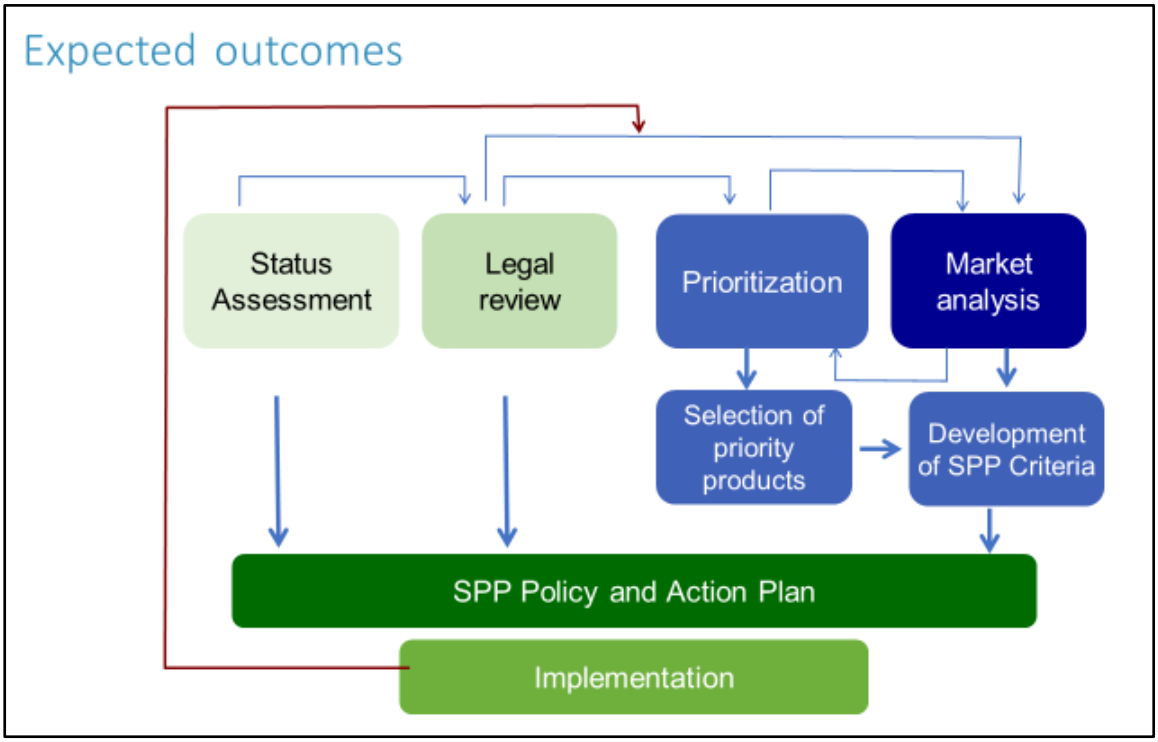


Figure 1: UNEP Sustainable Public Procurement Approach

[5] https://doe.gov.in/divisions/task-force-sustainable-public-procurement
[6] 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[7]:

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 procurement criteria within this framework have been defined on the basis of key environmental impacts across the life cycle stages of a product. For 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

[7] "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 through its life cycle.

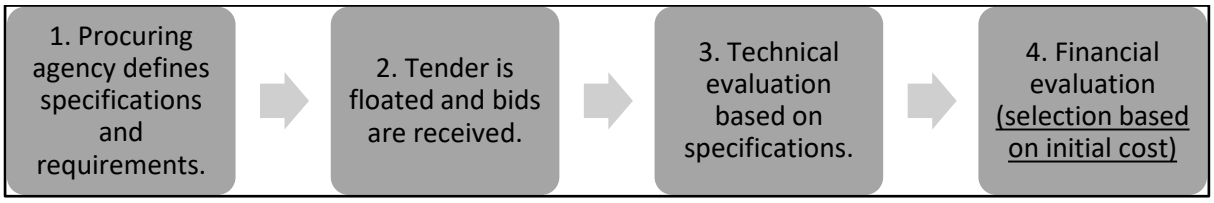


Figure 2: Conventional tender procurement process

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.

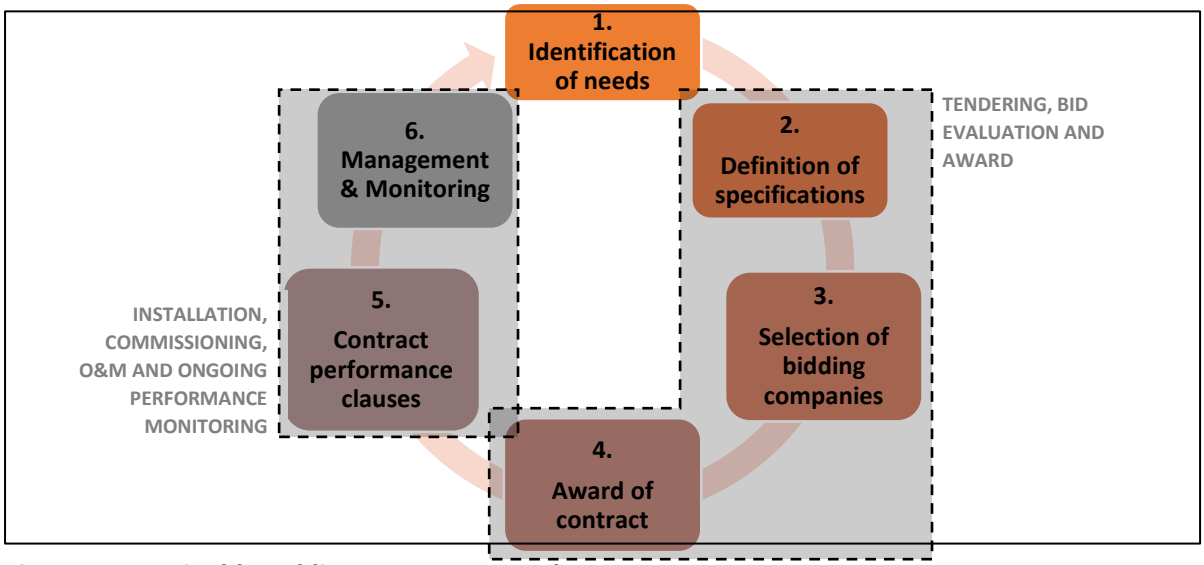


Figure 3: Sustainable Public Procurement Cycle

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. 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 fairly recently. All products procured by public organizations are not listed on this e-marketplace as the portal is still evolving.

Upon request, a list of ten product categories, by value and volume, for 2-3 years, was made available from GeM, which was arranged in descending order with respect to both variables, and presented in a meeting held on June 10th, at the Ministry of Finance (minutes and attendees list are attached as Annex 1).

Figure 4: Five life cycle stages of a product

The list 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 Results

Three product groups/categories 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.

As a starting point, lists made available from the Government e-Marketplace's (GeM) records of the top 30 product categories by value and volume (number of tenders) were examined. The top ten entries in terms of value were shortlisted: 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.

The selected categories were:

1. Writing and printing paper
2. Disinfecting/cleaning solutions
3. Room air-conditioners

Annex 2 provides the long list of products that were used in the selection exercise.

A preliminary market assessment was carried out for all three prioritized product categories. Results for the category paper are presented in Part 1, results for disinfecting/cleaning solutions in Part 2, and air-conditioners in Part 3 of this report.

4. Paper

4.1 Conventional procurement criteria

For writing and printing paper, the relevant BIS standard is IS 1848:2007 which all suppliers must ensure is fulfilled: specifications available to choose from on the Government e-marketplace portal are as follows:

- 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 not identified as sustainability criteria, even though they appear as specifications, and form part of the IS 1848:2007 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.

Sustainability criteria are discussed in terms of

1. Organizational criteria
2. Environmental and Social criteria, and,
3. Availability of standards/labels in India and internationally.

First, Organizational criteria are presented, then for disinfecting/cleaning solutions and last, for air-conditioners. 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: The manufacturer produces third-party certification for compliance with ISO 14001 (Environmental Management System) to the procuring agency.

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).

The 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 fibre, affects tribals 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: Key environmental impacts associated with different life-cycle stages for paper

Life cycle stage	Impact	Recommended SPP approach
Raw material extraction	Potential loss of biodiversity: In India forests: even though many companies rely on agroforestry models for procurement of wood, the loss of biodiversity due to monocultures (planting of one variety of crop) cannot be ignored.	Considering the hotspot with respect to paper's product life-cycle is in the manufacturing stage the following are recommendations: 1. Prefer paper made by companies using pulp from 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) 2. Mandate elemental chlorine-free bleaching processes (manufacturer's declaration) 3. Packaging should be biodegradable; multilayer packaging not to be used.
Product manufacture	• Emissions to air and water due to chemical consumption during pulp and paper production: the production process use several chemicals which are emitted into the air and water. Chlorine-based bleaching is associated with toxic impacts on human health. • Energy and water consumption during production: paper manufacture is a highly water- and energy-intensive process. However, companies in India have taken numerous steps to become efficient on both these counts.	
Transport	• Emissions associated with	

	fuel burning during transport from manufacturing unit to retailers and wholesalers • 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) Environmental and social criteria in Indian context deriving from impacts:

- Raw material: procurement of paper based on post-consumer recovered paper fibre (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 75% (Annex 3).

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.

There are no ecolabels for paper in the Indian market; the BIS specifications do not cover environmental impacts except at organizational level that is, adherence to the state or central pollution control boards' rules. The BIS eco-mark (attached in Annex 4) provides the following product specifications:

- The paper and paper boards manufactured out of pulp containing not less than 60% by weight of pulp made from materials other than bamboo, hard woods, soft woods and reed.
    - Issue: Most manufacturers use one kind of raw material. Also, this label does not account for paper made of 100% FSC certified wood.
- Recycled paper and paper board must be made from 100% waste paper
    - Issue: A significant number of recycled-paper mills (barring large companies) use chlorine in their bleaching processes and most do not comply with environmental regulations.

4.3 Preliminary market assessment

Data and market information were gathered directly from the Indian Paper Manufacturer's Association and private sector companies and documents of the Bureau of Indian Standards; this was done in face-to-face meetings and telephone conversations with managers from some of the manufacturing companies.

Secondary data was collected from the 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 and copier paper, from hardwood pulp) is available in the Indian market and manufactured in India. Annual paper production is 17 million tonnes per annum (MTPA) of which 5.9 MTPA is of the writing and printing grade. 3.34 MTPA 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.

Many of the large integrated pulp and paper factories have FSC certification (Forest Stewardship Council: this includes certification on social and labour aspects), which require adherence to international (ILO) and Indian labour laws. FSC-certified paper is demanded by companies importing paper from India only. Within the country there is no market for this certification. The consumption or demand of writing and printing paper is estimated at 5.5 MTPA.

India imports a large amount of waste paper for recycling, carried out in units on the medium and small-scale sector of industry. The writing and printing grade produced in these units are of a much lower quality than that made by the large producers. These units use chlorine for bleaching. All factories using agro-residue as fibre source, use elemental chlorine to bleach, with the exception of one company.

Large paper mills often bid for government tenders through an agent who handles all the documentation and ensures that payments are collected: they rarely deal directly with government agencies.

4.3.2 Availability of sustainable options

Writing and printing paper is available in the ECF category, although no label exists for this. Since this type of paper falls in the premium segment, according to manufacturers, it is made by companies in

the large, organized sector, which mostly, are able to produce FSC-certified and elemental chlorine-free paper. These are freely available in the market.

4.3.3 Assessment of supply (manufacturers, capacity, local production, involvement of SMEs)

India's share in world production of paper is about 3.7%. Of the total annual paper production of 17 million tonnes, an estimated 5 MTPA is of the writing and printing grade. Roughly half of the writing/printing paper is made by the large, organized, integrated pulp-and-paper mills. The balance is produced in small and medium enterprises (SMEs). The bleaching process is an absolute necessity to produce writing and printing paper. The SMEs use elemental chlorine for their bleaching process. Of the total writing and printing production, about 3.34 MTPA is elemental chlorine-free (ECF) and so belongs to the 'sustainable' category. Large enterprises such as JK, ITC, Ballarpur, Century, West Coast paper, Tamil Nadu Newsprint and Paper Ltd., who operate integrated pulp and paper mills have the capacity to produce ECF paper and some are FSC-certified and also produce FSC-certified paper.

Very few of the paper mills in the SME sector have environmentally sustainable practices, even though the fibre source used is largely recovered paper, which reduces the import demand. This may be said to be an environmentally sustainable practice, but inefficiencies in energy use and the use of chlorine as bleaching agent, would likely offset gains made by reducing the demand for virgin pulp. DPIIT issued an order in July 2018 specifying minimum local content in different classes of paper (for public procurement), meeting the relevant BIS requirements. For writing and printing paper, as well as copier paper (cut size) this is 75%. This requirement is met by the large manufacturers in the organized sector.

About 980 thousand tonnes of paper are exported from India, while about 3 million tonnes are imported, of which newsprint forms the largest fraction.

4.3.4 Existence of EMS

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

4.3.5 Assessment of demand

4.3.5.1 Global demand

In the last ten years the domestic demand for paper has doubled from around 9 million tonnes in FY 2007-08, to over 17 million tonnes in 2017-18. Demand is expected to grow at a CAGR of 6-7% and reach about 24 million tonnes by FY 2024-25. The per capita consumption of paper is 13-14 kg per annum compared to a global average of 57 kg. Agro/farm forestry initiatives by the paper industry spread across about 900,000 hectares with over 90% of the demand for wood by the pulp and paper industry being sourced from industry-driven agro/farm forestry. The paper industry employs directly, about 500,00 people.

4.3.5.2 Public demand

Data not available in public domain.

4.3.6 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 suggested that Indian customers were not willing to pay a premium for FSC certified paper: it is mostly exported.

Table 2: Typical cost of FSC-certified and non-certified 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)

4.4 Recommended procurement criteria

Since there are no specific environmental and sustainability standards, FSC certification or its equivalent may be adopted and followed. There are enough FSC-certified manufacturers of writing and printing paper, there is unlikely to be any difficulty in market availability on this count.

Considering that (i) wood fibre sourced from plantations is environment-friendly (ii) raising plantations serves local farmer communities, the Department of Expenditure may consider issuing an order mandating that all writing and printing paper procured should have

1. certification from the Forest Stewardship Council (or equivalent); and
2. an elemental chlorine-free bleaching process.

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 31st July 2018, under Public Procurement (Preference to Make in India) Order, 2017, mandating a minimum local content of 75% for writing and printing paper (to be reckoned with reference to ex-factory, pre-GST price). This criterion can also be easily met since majority of the inputs in paper industry are locally procured.

5 Disinfecting/Cleaning Solutions

5.1 Conventional procurement criteria

With respect to environmental impacts, current BIS criteria only mandate the absence of mercury in cleaning solutions, and performance characteristics.

At present the specifications available to choose from on the Government e-marketplace portal are as follows:

- Colour
- Fragrance
- Main ingredients
- Physical characteristics
- Stain cleaning
- Viscosity
- Disinfecting properties
- Safe to hands
- Fumes while cleaning
- Packing material
- Packing size
- Pack with dispensing nozzle

5.2 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.

Sustainability criteria are discussed in terms of

1. Organizational criteria
2. Environmental and Social criteria, and,
3. Availability of standards/labels in India and internationally.

First, Organizational criteria are presented, then for disinfecting/cleaning solutions and last, for air-conditioners. The Environmental and Social criteria are then described, which are divided into Impacts, and, Criteria deriving from impacts.

5.2.1 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 of product shall produce the consent clearance as per the provisions of the following Acts and respective Rules made thereunder, 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: The manufacturer of product shall produce third-party certification for compliance with ISO 14001 (Environmental Management System) to the procuring agency.

5.2.2 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).

Table 3: Impacts associated with different life-cycle stages for disinfecting/cleaning solutions

Life cycle stage	Impact	Recommended SPP approach
Raw material extraction	Ingredient sourcing, especially for commodities with ingredients of oleochemical origin (palm or coconut) have impacts in terms of land transformation and water depletion.	1. Avoid presence of EDTA, NTA, phosphorus in product as binder. 2. Decrease quantity of packaging. Mandate 25% of packaging made from recyclable plastic. 3. Minimize dyes and fragrances as these do not serve any significant purpose. No phthalates used as fragrance/perfume 4. Concentrated solutions are produced so as to minimize packaging. The Confederation of Indian Industry has developed the GreenPro Certification Standard for cleaning chemicals (http://activeads.in/greenpro/greenpro-standards/GreenPro-Standards-for-Cleaning-Chemicals.pdf)
Product manufacture	• Environmental impacts associated with manufacturing are a small share of the overall life cycle impacts • Most liquid commodities are packaged in HDPE plastics. The climate change impacts of production of plastics from fossil fuel are well documented.	
Transport	• Emissions associated with fuel burning during transportation from manufacturing unit to retailers and wholesalers • Transport had contribution to terrestrial acidification, photochemical oxidation formation, ozone depletion, particulate matter formation	
In-use	Depends on type of ingredients used in the product. Disposal into drains and sewerage and subsequently into water bodies/land leads to eutrophication and impacts on human health, uptake by crops. (details by type of ingredient in the text below the table).	
Disposal	Disposal of packaging material.	

The general category of disinfecting/cleaning solutions can include products used to clean floors, bathrooms, toilets, kitchens (domestic and industrial facilities). Cleaning products and services can have various environmental and social impacts that have to be assessed. In general, these products contain different chemicals, not rarely toxic. Different chemicals in the product have different functions. Some of these are described below (UNEP Background Report, 2008):

- Surfactants: Short for 'surface active agent', these help to reduce the surface tension of the water used in cleaning, thus enabling it to mix with, and remove dirt more easily. As a result of their surface-active properties, surfactants are relatively toxic to aquatic organisms.
- Chelating/complexing agents: These are included to counter the effects of hard water which reduces the effectiveness of detergents. Phosphates and EDTA have traditionally been used as chelating agents in cleaning products.
- Builders: These have a similar effect to chelating agents, and are used to upgrade and protect the cleaning efficiency of surfactants, they help to soften the solution and to break up oily and greasy dirt. Phosphates have often been used as builders.
- Solvents: These help to break up dirt particles and dissolve them in the water solution.
- Preservatives: These help to increase the lifetime of the product by preventing bacteria from spoiling the solution.

Overall, an analysis over the product's life cycle shows that ingredients (surfactant, bleach or acid) sourcing, manufacturing, transport and packaging are the hotspots, with ingredient sourcing one of the largest contributors.

A few examples of harmful/hazardous chemicals used in disinfecting and cleaning solutions and their associated impacts are described below (UNEP Background Report, 2008):

- EDTA (ethylenediaminetetraacetic acid): a very strong complexing agent. Complexing agents may have the effect of re-mobilizing heavy metals into the aquatic environment. EDTA is particularly problematic in this regard as it is poorly biodegradable and relatively strong.
- NTA (nitrilotriacetic acid): a possibly carcinogenic builder that requires the use of carcinogens and toxic substances in its production. It may also re-mobilise heavy metals in aquatic environments
- Phosphorus (including phosphates and phosphonates): used as a “builder” in cleaning products, phosphorus is a major cause of eutrophication in water systems, though the impact depends on the wastewater treatment process and temperatures of the receiving waters in individual countries. In Sweden, for example, treatment is highly effective, and use of phosphorus no longer presents a major problem, however treatment in warmer climates can be more problematic. Phosphorus is a particular concern in laundry detergents.
- VOCs (volatile organic compounds): Volatile organic compounds (such as ethanol and isopropanol) are found in many cleaning products. VOC emissions cause ground level ozone and photochemical smog. When highly concentrated in the air, ozone can impair human health and can damage forests, vegetation and crops, reducing yields.
- APEOs or APEs: APEOs (alkylphenolethoxylates), are highly harmful surfactants. In Europe APEOs were recently banned as part of a new detergents regulation.
- Heavy metals: this term covers a range of substances including arsenic, lead, cadmium, chromium and mercury. These metals are usually toxic and chronic low exposures can have serious health effects.

All these chemicals can have negative impacts on human health (cleaning staff and people using the cleaned buildings) and environment (chemicals can directly enter the environment, the atmosphere or rivers/lakes/ oceans through wastewater/sewage discharge and endanger ecosystem health).

(a) Environmental and social criteria in Indian context arising from above impacts

- Product ingredients should not contain triclosan (suspected of interfering with human hormones), nanosilver (linked to neurological disorders), or substances that release formaldehyde (suspected of causing cancer, allergies and asthma).
- For surfactants, select substances which are biodegradable and consider renewable raw materials.
- For builders, prefer sodium citrate and sodium bicarbonate, (over EDTA, NTA and phosphorus) as these have fewer environmental impacts.
- For solvents, pine oil and d-limonene appear to have fewer environmental impacts.
- Antimicrobials are unnecessary for the cleaning performance of some cleaners, but most have dual purposes. Pine oil appears to have fewer impacts than either sodium hypochlorite or quaternary ammonium compounds.
- Dyes and fragrances should be eliminated or minimised as they do not add to function.
- Packaging: The final product should be packaged in material that is recyclable after use and be certified for this.
- If plastics are used for packaging, then additional to post-use recyclability, the plastic should have a minimum amount of recycled content.
- Adherence to labor law standards: 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.
- Make in India: companies with manufacturing facilities in India to get preference.

5.2.3 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

The Confederation of Indian Industry has developed the GreenPro Certification Standard for cleaning chemicals: the companies registered under this standard belong to the small/medium enterprises category. Some manufacturers of Ekam Eco Solutions, Haylide Chemicals Pvt Ltd., Herbocare, Richie Raffle Biotech Pvt. Ltd., Lemmens Shardlow India Pvt Ltd.

5.3 Preliminary market assessment

Data and market information were gathered directly from the Indian Paper Manufacturer's Association and private sector companies and documents of the Bureau of Indian Standards; this was done in face-to-face meetings and telephone conversations with managers from some of the manufacturing companies.

Secondary data was collected from the websites of companies and business-and-economy-related newspaper articles.

5.3.1 Features of the Indian market

Disinfecting and cleaning solutions including those for floor, washroom, glass and general surface cleaning in commercial establishments, hospitals, government facilities, homes, factories, and public places such as stations, are available in the Indian market and are made in India. Growth in the market is expected to increase due to an increase in the number of hospitals, for example, and greater awareness about infection control.

Companies such as Hindustan Unilever and Reckitt Benckiser are in the large, organized segment, while there are many operators classified as medium and small enterprises. The cleaning chemicals market was worth about Rs 18,000 crores in 2016, and is projected to grow at a CAGR of 15% in value terms because of the increased incidence of infections, urbanization, growing number of new commercial setups and stricter safety standards.

5.3.2 Availability of sustainable options

At retail level, there is nothing on product labels to indicate whether the composition of the disinfecting/cleaning solution excludes or includes environmentally-safe chemicals/ingredients. The table below compares the components of typical cleaning solutions available in the retail market (Products 1 to 6 correspond to six similar products made by six different manufacturers which were studied) with the list of banned chemicals in the European Union at present.

Table 4: Components of typical cleaners available in the Indian retail market, compared with those in the European Union's banned/restricted list

Prohibited chemicals as per EU regulations	Product 1	Product 2	Product 3	Product 4	Product 5	Product 6
APEO (alkyl phenolethoxylates) and ADP (alkylphenols and derivatives thereof)	Not listed	Not listed	Not listed	Not listed	Not listed	Not listed
EDTA (ethylenediamine tetraacetate)	Not listed	Disodium EDTA listed	Not listed	Not listed	Tetra sodium EDTA listed	Not listed
5-bromo-5-nitro-1,3-dioxane	Not listed	Not listed	Not listed	Not listed	Not listed	Not listed
2-bromo-2-nitropropane-1,3-diol	Not listed	Not listed	Not listed	Not listed	Not listed	Not listed
Diazolinidylurea	Not listed	Not listed	Not listed	Not listed	Not listed	Not listed
Formaldehyde	Not listed	Not listed	Not listed	Not listed	Not listed	Not listed
Sodium hydroxyl methyl glycinate	Not listed	Not listed	Not listed	Not listed	Not listed	Not listed
Nitromusks and polycyclic musks	Not listed	Not listed	Not listed	Not listed	Not listed	Not listed
There are restrictions on	Not listed	Benzalkonium	Benzalkonium chloride	Benzalkonium chloride	Benzalkonium chloride	Not listed

the use of quaternary ammonium salts and biocides.		chloride and Denatonium benzoate listed	listed	listed	listed	
Fragrances (phthalates)	Present-chemical not specified	Present-chemical not specified	Present-chemical not specified	Present-chemical not specified	Present-chemical not specified	Present-chemical not specified
Phosphorus	Not listed	Not listed	Not listed	Not listed	Not listed	Not listed
Volatile organic compounds	Not listed	Not listed	Not listed	Not listed	Not listed	Not listed

5.3.3 Assessment of supply (manufacturers, capacity, local production, involvement of SMEs)

There are different IS standards for different classes of cleaning liquids (for example, IS 1061 2017 refers to Disinfectant fluids of the phenolic type; IS 7983 1994 specifies performance for the category, Toilet Cleaner Liquid; IS 10758 1983 refers to Deodourising-cum-disinfecting Fluids; IS 8540 1986 deals with Glass cleaner liquids; IS 13760 1993 refers to Toilet cleaning powders).

The specifications in the above standards pertain to the performance of the product, its physical and chemical properties, stability on storage, germicidal properties, efficacy of removing stains, and the tests prescribed for determining these features. There is no toxicological information (for example, about hazardous materials (an exception is a requirement for declaring the product is mercury-free for the classes: Disinfectant fluids of the phenolic type; and, Deodorising-cum-disinfectant fluids), information about ecological importance (such as toxicity to fish, algae; degradability; bio-accumulative potential), and disposal of packaging.

On GeM however, the composition of at least one product contains quaternary ammonium salts (banned in the EU).

It is hard to apportion production to the companies making disinfecting and cleaning solutions; broadly speaking, the cleaning chemicals market is controlled by Hindustan Unilever Pvt. Ltd., Reckitt Benckiser India, Diversey India Pvt. Ltd., Schevaran Laboratories Pvt. Ltd., Satol Chemicals, Ecolab India, Buzil Rossari Pvt. Ltd., Haylide Chemicals Pvt. Ltd., Altret Industries Pvt. Ltd., S.C. Johnson Products Pvt. Ltd., among others.

5.3.4 Existence of EMS

Large companies as well as small and medium enterprises comply with standards such as ISO 9001, ISO 14001 and OHSAS 18001.

5.3.5 Assessment of demand

5.3.5.1 Global demand

Data not available in public domain.

5.3.5.2 Public demand

Data not available in public domain.

5.3.6 Cost differential between 'sustainable' and 'normal' products

No 'green' disinfecting/cleaning solutions available in retail outlets.

5.4 Recommended procurement criteria

Clear information about the composition of disinfecting and cleaning solutions is not readily available. No labels covering environmental criteria are available at national level, either. However, the following criteria are simple to fulfill and applicable to manufacturers at any scale.

In view of these conditions, sustainability criteria, could be:

1. prefer solutions with no colourant/dye used
2. no phthalates used as fragrance/perfume
3. 25% of packaging is made of recycled plastic
4. concentrated solutions are produced so as to minimize packaging

6 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.[8] 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 has 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.

6.1 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 for discussion with stakeholders (including procurement agencies, manufacturers, technology providers, end-users, etc). The final criteria will be framed based on feedback and deliberation with all stakeholders.

6.2 Key Environmental Impacts

Airconditioning, 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 summarised in the table below. The

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

table also presents the Sustainable Public Procurement (SPP) approach to mitigate or reduce these key environmental impacts.

Table 5: 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). Procurement of air conditioners from suppliers and manufacturers that follow the sustainable end of life practices.

6.3 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 proposed 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.

6.3.1 Procurement Cycle

6.3.1.1 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.

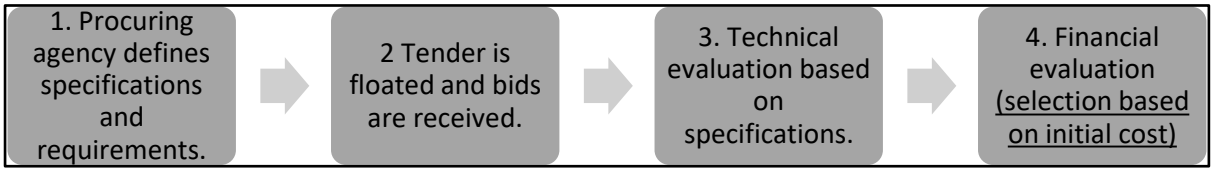


Figure 5: Conventional tender procurement approach

6.3.1.2 Proposed 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.

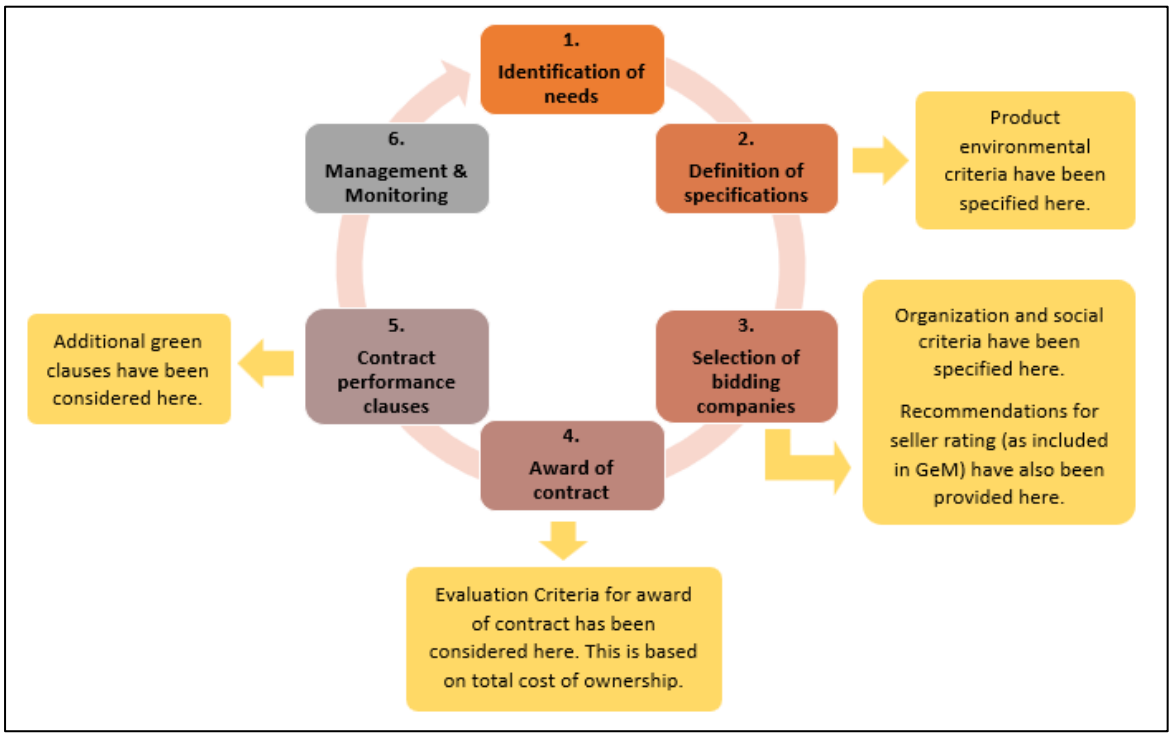


Figure 6: Sustainable Public Procurement Cycle

The proposed evaluation process considers total cost of operation which considers real costs over the duration of ownership of 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, is also recommended to have a weighted average score for final product selection that considers all environmental and financial considerations.

6.3.2 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 portal to enable sustainable procurement. In this scenario, inefficient room air conditioners will automatically not be listed for selection or evaluation.

Table 6: 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
Packing List	
Any other Features	Additional specifications based on product environmental criteria can be added. Example: • Rated ISEER • Take-back or buy-back option available with the manufacturer. (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.

6.3.3 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.

6.4 Development of the Sustainable Public Procurement Framework for Room Air Conditioners

The Sustainable Public Procurement framework proposed 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.

6.4.1 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 7: Criteria for identification of need

Conventional Criteria	Core Criteria	Comprehensive Criteria
A. **Product Type** The inverter air conditioner (variable speed) is more energy-efficient than a fixed speed air conditioner (which consumes more energy).		
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. Verification Instrument: Product code and specification sheet.	

6.4.2 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 8: 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 Revised /IEC 60335-2-40 (under preparation) and all other requirements specified in this standard. Verification: Certification (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 notified under the Environment (Protection) Act, 1986 from time-to-time but not more than the limits specified under the standard issued by BIS (IS 1391 Revised). Verification Instrument: Certification (third party – accredited test agency) for compliance to be provided to the procuring agency	
C. Energy Consumption 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. *For example:* *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 labeled variable speed air conditioners. At least 75*		

Conventional Criteria	Core Criteria	Comprehensive Criteria
models from 12 brands registered, have an ISEER of 5 and above.		
GeM recommends the purchase of star labeled 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. Verification Instrument: 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. Verification Instrument: 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. The refrigerant should have Zero ODP. The Global warming potential (GWP) not exceeding 750 (100 years)[9] is recommended until a specific directive is issued by MoEFCC. Verification Instrument: Certification (self or third party) for compliance to be provided to the procuring agency.	
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. Verification Instrument: Certification (self or third party) for compliance to be provided to the procuring agency.
F. Paint		
		Paints used in the product shall not contain heavy metals or

[9] 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
		their compounds include mercury (Hg), lead (Pb), cadmium (Cd) and hexavalent chromium (Cr). Verification Instrument: 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. Plastic packaging shall not contain halogenated hydrocarbon. Verification Instrument: Certification (self or third party) for compliance to be provided to the procuring agency.

6.4.3 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 9: 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 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, • 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,	

Conventional Criteria	Core Criteria	Comprehensive Criteria
	• Batteries (Management and Handling) Rules • The Manufacture, Storage and Import of Hazardous Chemical Rules. <u>Verification Instrument:</u> The manufacturers shall produce necessary documentation for compliance with requirements of these Rules to the procuring agency. 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. 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. The recommended ambient noise levels shall always be adhered to by cooling appliance manufacturing facilities. <u>Verification Instrument:</u> Certification (self or third party) for compliance to be provided to the procuring agency	
A3. 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.		
	No manufacturing facility shall employ equipment that releases ozone-depleting substances, and all existing	

Conventional Criteria	Core Criteria	Comprehensive Criteria
	equipment should be in the process of phasing out ozone-depleting substances. No manufacturing facility shall export or import ozone-depleting substances, equipment, or instruments to any country. 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. No manufacturing facility or any associated person(s), shall establish, expand, or invest in, ozone-depleting substances, equipment, or instruments. Verification Instrument: 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) Verification Instrument: 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. Verification Instrument: 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	

Conventional Criteria	Core Criteria	Comprehensive Criteria
	establishments), as specified within the provisions of the various Rules and Regulations prepared from time to time. Verification Instrument: 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. Verification Instrument: Self-declaration

6.4.3.1 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.

6.4.4 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 10: Criteria for award of contract

Conventional Criteria	Core Criteria	Comprehensive Criteria
Multiple procurement options as per GeM are below: 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.	All shortlisted room air conditioners should meet all of the technical specifications outlined in the core criteria under "Defining Specifications". All manufacturers shortlisted meet the core criteria under "Selection of bidding companies". Once both the above criteria are met, the room air	All shortlisted room air conditioners should meet all of the technical specifications outlined in the core criteria under "Defining Specifications". All manufacturers shortlisted meet the core criteria under "Selection of bidding companies". The product is shortlisted based on the total cost of ownership (TCO).

d) The intent of Buying PAC - 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. All of the above consider products with the least acquisition are procurement.	conditioner with the lowest acquisition price can be selected for the procurement. <u>Verification Instrument:</u> No additional requirement.	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 life-related cost shall be defined by the procurement agency in advance. <u>Verification Instrument</u> Supporting data for the calculation of the total cost of ownership shall be provided by the manufacturers of the room air conditioner (bidders).

6.4.5 Contract Clauses & Management & Monitoring

The contract clauses outlined below are not comprehensive to include installation, commissioning, maintenance, and annual maintenance and monitoring clauses. 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 11: Criteria for contract clauses

Conventional Criteria	Core Criteria	Comprehensive Criteria
A. Safe Disposal 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 5 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 6.		
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. <u>Verification Instrument:</u> The tender submission that indicates this clause.	Include the true cost of end of life strategy. <u>Verification Instrument:</u> Life cycle assessment that indicates the end of life impacts and costs.

6.5 Life cycle-based evaluation for room air conditioners

Currently, the sustainable public procurement framework recommends the selection of room air conditioners based on technical specifications (ISEER and GWP) or the total cost of ownership. Both give 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 assessment based 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.

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

Method 1 represents the present situation in which the procuring agency need not 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.

6.5.2 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.

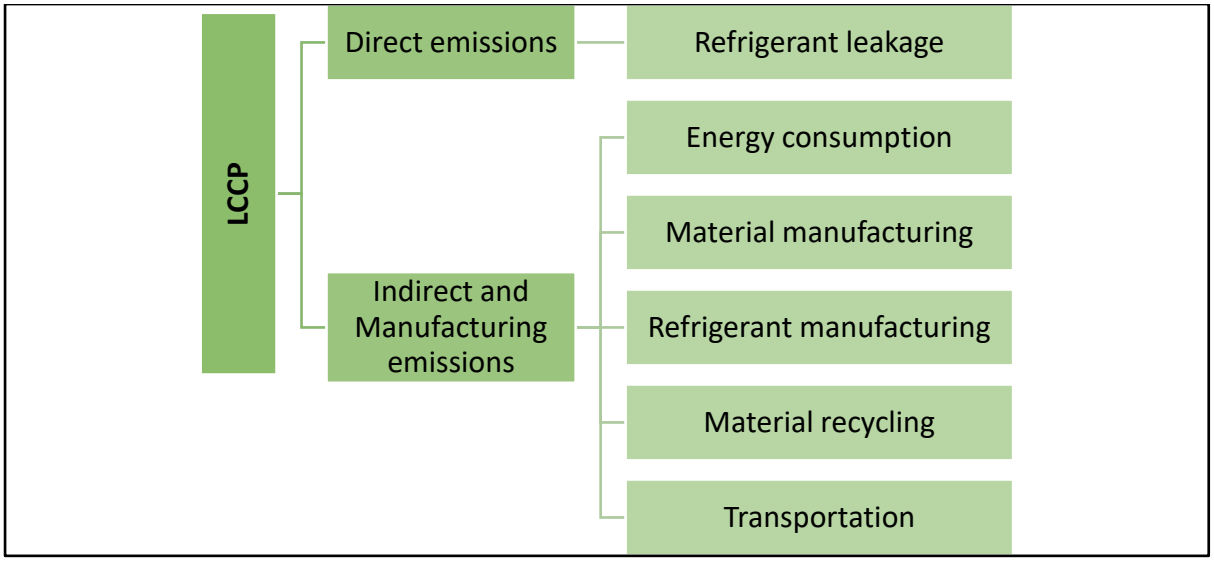


Figure 7: Life Cycle Climate Performance (LCCP) for Room Air Conditioner

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,

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

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.

6.5.3 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.

6.6 Cost Consideration

The total cost of ownership (TCO) is recommended as an evaluating methodology for comparing room airconditioners. 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:

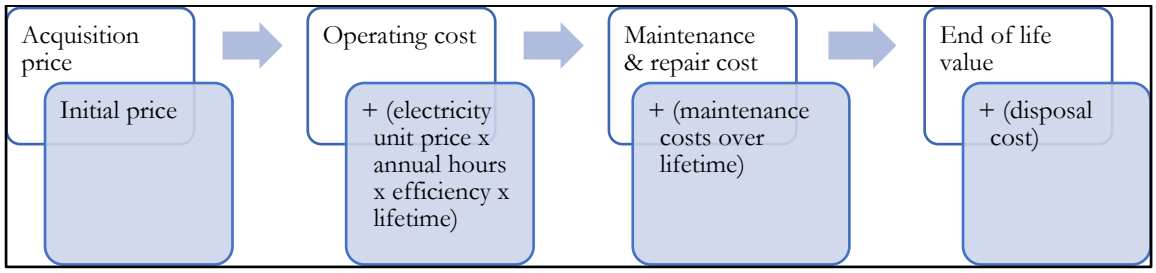


Figure 8: Methodology for Total Cost of Ownership analysis

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 12: Sample comparison of the total cost of ownership (TCO)[10]

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 discposal), 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 are better air quality.

[10] 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.

6.6.1 Implications for the proposed criteria set

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

Table 13: Implications of the newly proposed SPP criteria

Newly proposed 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 and "take-back" clause in contracts.	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.

6.7 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.

6.7.1 Market readiness analysis: supply

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.[11] 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

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

2017-18 baseline. The building sector cooling demand shows the most significant growth at nearly 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.[12]

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%.

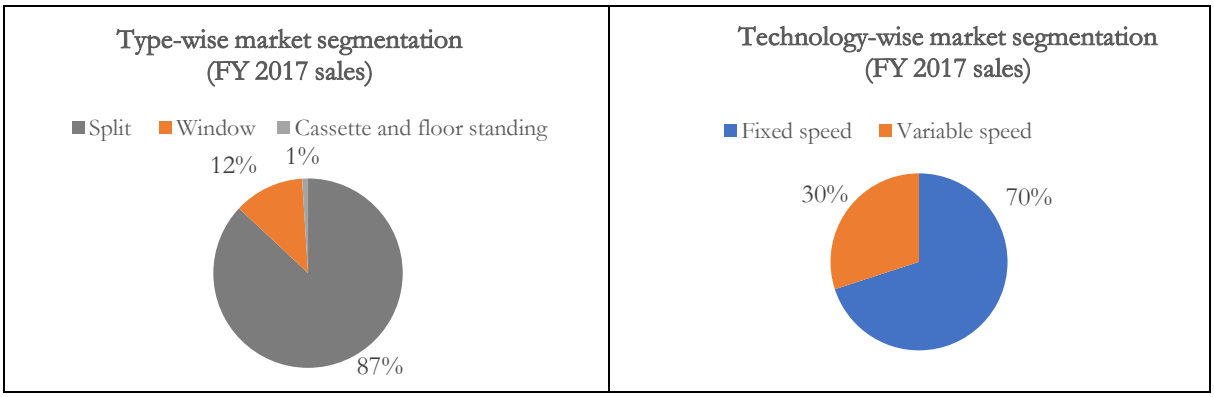


Figure 9: RAC market segmentation

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)[13], 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.

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

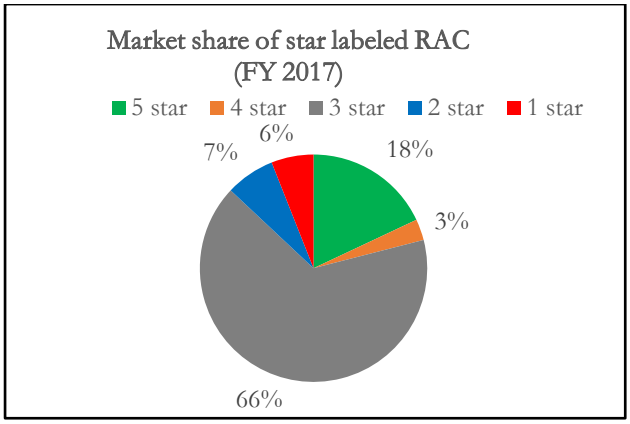


Figure 10: Market share of star labelled RAC

6.7.2 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.

6.7.3 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 labeled. The 5-star labeled 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 labeled variable speed ACs, there are approximately 400 models registered under different brands. Among these, **there are at least 75 models from 12 brands having 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.[14] The annex include a list of super-efficient room air conditioners (ISSER>5) (variable speed) as listed on the BEE website.

6.7.4 The extent of local production

The 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

[14] http://www.beestarlabel.com/SearchCompare

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.

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.

6.7.5 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.

6.7.6 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).

6.7.7 Impact of the import of the prioritized goods on local producers

Since the majority of 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.

6.7.8 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.

6.7.9 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.

6.7.9.1 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[15].

6.8 Market readiness analysis: Demand

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

6.8.1 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 7 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 extent is 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.

6.8.2 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 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.

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

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

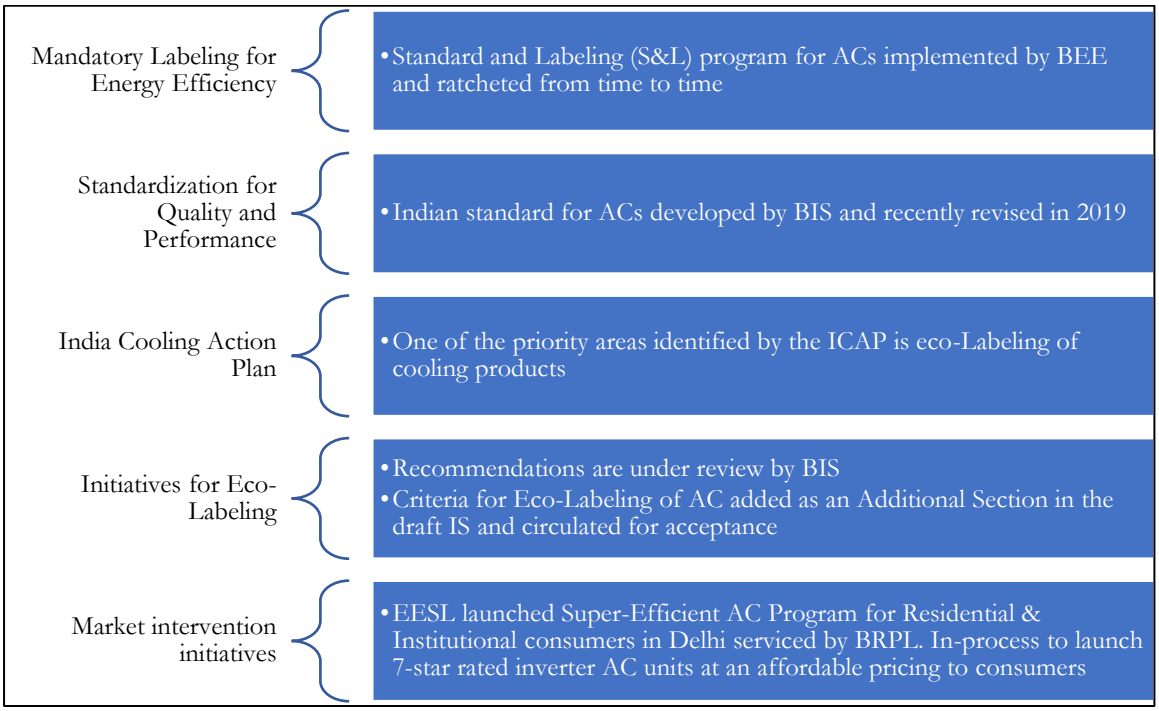


Figure 11: SPP National Programs, Policies, and Instruments Overview

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:

1. certification from the Forest Stewardship Council (or equivalent); and
2. an elemental chlorine-free bleaching process.

Clear information about the composition of disinfecting and cleaning solutions is not readily available. A GreenPro certification is available for the Indian context and some manufacturers have this certification. However, the following criteria are simple to fulfill and applicable to manufacturers at any scale. In view of these conditions, sustainability criteria, could be:

1. prefer solutions with no colourant/dye used
2. no phthalates used as fragrance/perfume
3. 25% of packaging is made of recycled plastic
4. concentrated solutions are produced so as to minimize packaging.

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 conditioner, 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

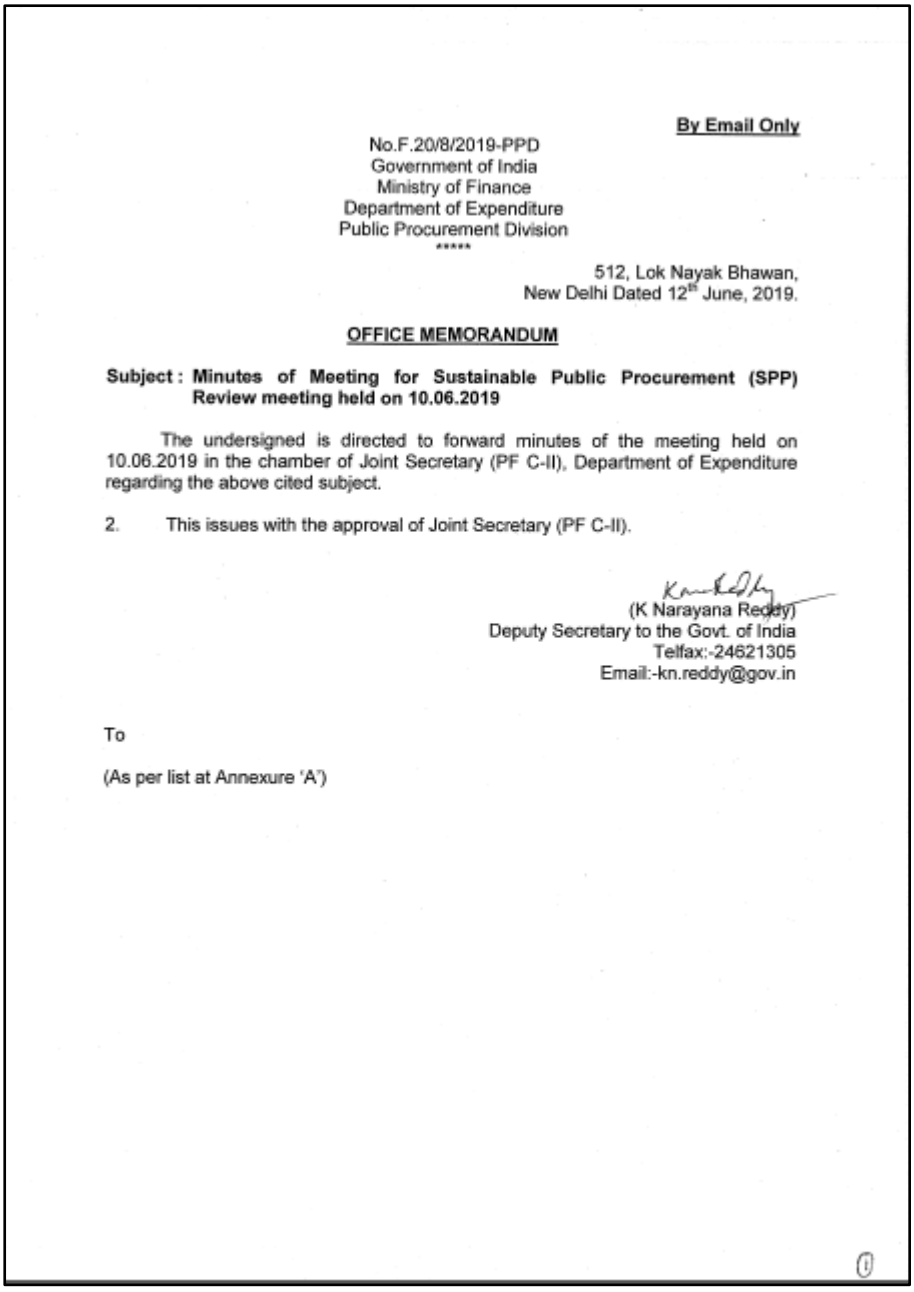
efficiencies has been recommended. The energy efficiency threshold can be periodically evaluated based on global and Indian market assessments.

Further, refrigerants with zero ozone depletion potential (ODP) and a global warming potential (GWP) of less than 750 (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,

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	9717377876	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

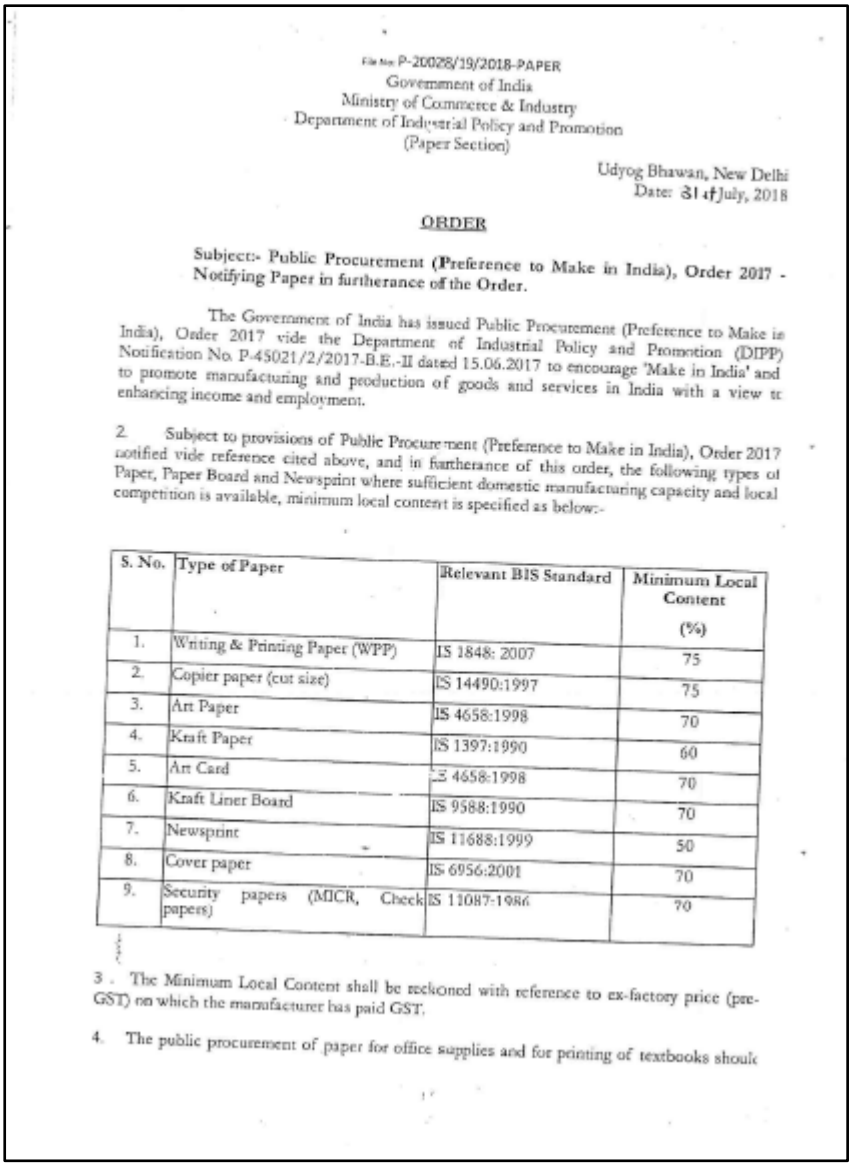
Annex 2: Long list of products for prioritization

Table 14: 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
		2. Tables	Not	NA	NA	H	H	L	L	H	M

	Type of	Product	Eco Label			Value	Volume	Environmental Impact			Socio-economic
			available								
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 of Industrial Policy and Promotion
(Paper Section)

Udyog Bhawan, New Delhi
Date: 31st July, 2018

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 of Industrial Policy and Promotion (DIPP) Notification No. P-45021/2/2017-B.E.-II dated 15.06.2017 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. Subject to provisions of Public Procurement (Preference to Make in India), Order 2017 notified vide reference cited above, and in furtherance of this order, the following types of Paper, Paper Board and Newsprint where sufficient domestic manufacturing capacity and local competition is available, minimum local content is specified as below:-

S. No.	Type of Paper	Relevant BIS Standard	Minimum Local Content (%)
1.	Writing & Printing Paper (WPP)	IS 1848: 2007	75
2.	Copier paper (cut size)	IS 14490:1997	75
3.	Art Paper	IS 4658:1998	70
4.	Kraft Paper	IS 1397:1990	60
5.	Art Card	IS 4658:1998	70
6.	Kraft Liner Board	IS 9588:1990	70
7.	Newsprint	IS 11688:1999	50
8.	Cover paper	IS 6956:2001	70
9.	Security papers (MICR, Cheque papers)	IS 11087:1986	70

3. The Minimum Local Content shall be reckoned with reference to ex-factory price (pre-GST) on which the manufacturer has paid GST.

4. The public procurement of paper for office supplies and for printing of textbooks should

be certified to manufactured in India by a paper mill that does not import more than 25% of its total raw material consumed.

5. Bulk Procurement should be only by placing the supply order directly on a domestic paper manufacturer or their authorised distributors/dealers.

6. Retail procurement (to be through GeM) should be in packs wrapped in bar-coded ream packing with clear indication of the domestic mill in which it has been manufactured. GeM should only register those suppliers who meet this condition.

7. This Order shall come into effect immediately.

8. DIPP shall be the Nodal Ministry to monitor the implementation of Order on Paper.

(Vandana Kumar)
Joint Secretary to Government of India

Copy to:
1. All Ministries/Departments of Government of India
2. Cabinet Secretariat
3. PMO
4. NITI Aayog
5. Joint Secretary (DIPP), Member - Convener of Standing Committee of Public Procurement, Order 2017
6. Comptroller and Auditor General of India
7. SS&FA, Department of Industrial Policy and Promotion
8. Internal Distribution

(Vandana Kumar)
Joint Secretary to Government of India

Annex 4: BIS Eco-mark criteria for paper

4.5 The *p*H value for all types of writing and printing papers shall be not less than 5.0.

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

4.7 White printing paper [*see* Sl No. (xvii) of Table 1] may also be tinted. In the case of tinted paper the colour should be an approximate match to the shade approved by the purchaser. The requirement for brightness shall not apply in the case of printing paper so tinted.

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 material shall be of the following two types depending on the raw material used in the manufacture:

a) *Type A* — Manufactured from pulp containing not less than 60 percent by mass of pulp made from materials other than bamboo, hardwood, softwood and reed.

b) *Type B* — Manufactured from pulp 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 is not damaged due to handling and transportation 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/m^2;

b) Size of the paper;

c) Mass of 500 sheets including wrapping paper, in kg/ream;

d) Lot number;

e) Month and year of manufacture; and

f) Indication of the source of manufacture.

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*, 1986 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 manufacturers 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 1 shall 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: Typical tenders for ACs[16]

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

[16] 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	
8.	Noise	Not defined	dB (A) 54
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

No.	Criteria parameter	Requirement
4.	Capacity	2 ton
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 (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 6: Information on Registered E-Waste Dismantlers/ Recyclers in the country

(as on 29-12-2016)

Sl. No	State	Number of Registration Recycler	Name & Address 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.) **(03 Tons/Day = 900 MTA with 300 days of operation)** 2. **M/s. ADV Metal Combine Pvt. Ltd.,** Shed No. -25, Borai Industrial Growth Center, Rasmada, Dist.- Durg (C.G) **(2.5 Tonnes/day) (750 MTA)** **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)** 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)** 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)** 4. **Pruthavi E-Recycle Pvt. Ltd.,** Plot No.- 31/32 Golden Industries Area Near Rolex Industries Vill- Kothariya Rajkot **(1069.2 MTA)** 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)** 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)** 7. **M/s. Greencare E-Recycle Company,** Survey No. 223/P, Plot No. 4, New Somnath Industrial -3 Vill-Kotharitya Dist-Rajkot (**2418 MTA**) 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**) 9. **M/s Recotech E-waste Management**, Plot No. 36-37, Aashirwad Industrial Estate, Udhana -Sachin Road, GIDC Naka, Sachin, Surat. (**2501 MTA**) 10. **M/s. E-front line recycling Pvt. Ltd.,** Shed No. C1B-905/9, GIDC, Panoli, Tal: Ankleshwar, Dist.: Bharuch, Gujarat-394116 (**3600 MTA**) 11. **M/s Dron E-waste Solution.,** Plot No. 56, G.I.D.C., Gozariya, Tal & Dist.: Mehsana, Gujarat, **(3012 MTA)** 12. **M/s Eximo Recyclers,** Plot No. 5/3, Raj Industrial Estate, Tal: Savli, Vadodara **(1200 MTA)** **(Total Capacity = 37262.12 MTA)**

Sl. No	State	Number of Registration Recycler	Name & Address 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)** 2. **M/s. A 2 Z E-Waste Management ltd.,** P No. 14 and 15 -Roz Meo Indusrial Area, Nuh Mewat. **(2000 MTA)** 3. **M/s. Giriraj Metal, P. No. 39** HSIIDC, IE, Kutana, Rohtak. **(2200 MTA)** 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)** 5. **M/s. Exigo Recycling Pvt. Ltd.,** G. T. Road, Samalkha Panipat **(6000 MTA)** 6. **M/s. Green World International, Pvt. Ltd.,** GR 60-61 ganpati Industrial Dham Industrial Area Bahadugarh Haryana **(5000 MTA)** 7. **M/s. R. K. Sons Enterprises (P) Ltd.,** Vill Lohari, Distt, Jhajjar **(14640 MTA)** 8. **M/s. Green Vortex Waste Management, (P), Ltd.,** P. No. 177/7, IMT, Manesar, Gurgaon **(1500 MTA)** 9. **M/s. Thapar Disposal Industries,** 902A/5/6, Chara Mandi Road, Ambala City **(1825 MTA)** 10. **M/s. Eco Friendly Metal Pvt. Ltd.,** Plot No. A-7, Ind. Estate No. 1, Near MR, Faridabad **(1500 MTA)** 11. **M/s. E-Waste Solution,** Industrial Shed 1A, Industrial Estate, Sec-06, Faridabad **(1000 MTA)** 12. **M/s. SMS Enterprises,** Plot No. 544 D, 1st Floor, Sec-37, Part –II, Pace City, Gurgaon **(360 MTA)** 13. **M/s. Earth Sense Recycle, Pvt. Ltd.,** Plot No. 100, Sector -5, IMT, Manesar, Gurgaon **(2160 MTA)** 14. **M/s Mittal Battery Industry,** Plot No.349, Indl. Area, Phase-I, Panchkula**. (3600 MTA)** 15. **M/s. Namo E-Waste Management Ltd.,** 14/1, Mathura Road, Faridabad Haryana **(5796 MTA)** 16. **M/s. Deshwal Waste Management Pvt. Ltd.,** Plot No. 292, Sector-7 IMT, Gurgaon. (**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)** 2. **M/s. E- Parisara Pvt Ltd**. Plot No. 30-P3, KIADB Industrial Area, Dabaspet, Nelamangala Taluk, Banglore Rural District- 562 111 (**8820 MTA)** 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)** 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)** 5. **M/s. E-Wardd & Co.,** No. 6/1B, 14th Cross Hosur Main Road,

Sl. No	State	Number of Registration Recycler	Name & Address Capacity in Metric Ton per Annum (MTA)
			Bommanahalli, Banglore -560 068 **(300 MTA)** 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)** 7. **M/s. ECO- BIRDD Recycling Company, Pvt.Ltd.** No185, Azeez Sait Industrial area, Nayandahalli, Mysore Road, Bangalore – 560039 **(350 MTA)** 8. **M/s. FA Enterprises,** B-8, Tamaka, Kaida, Industrial Area, Kolar, Karnataka - 563101 **(100 MTA)** 9. **M/s. Ameena Enterprises**, C-199, KSSIDC Industrial Estate, Hebbal Mysore- 570 017 **(560 MTA)** 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)** 11. **M/s. Trishyirya Recycling India Pvt. Ltd.**, No. 315, 4th Phase, Peenya Industrial Estate, Bangalore - 560 058 **(500 MT/A)** 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)** 13. **M/s. Tech Logic, Unit-2,** Shed No. 36, 2nd Main, Ranganathapura, Bangalore - 560 044 **(240 MTA)** 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** 15. **M/s. Sai Recyclers,** No. 20, KSSIDC Industrial Estate, Bhashettihalli, Versandara Post, Doddaballapura Town & Taluk, Bangalore Rural District. **(300 MTA)** 16. **M/s. Nobel Technology,** No. 46, 14th Cross, 4th Phase, Peenya Industrial Area, Bangalore - 596 058 (**300 MTA)** 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)** 18. **M/s. Ecovision Recycling,** No.D-65, Veerasandra Industrial Area, Hosur Road, Bangalore – 34. **(300 MTA)** 19. **M/s. Arrow Systems**, No.SM 3, 4th Phase, 3rd stage, Peenya Industrial Area, Bangalore - 560 058. **(120 MTA)** 20. **M/s. Digicomp Complete Solutions Ltd**, No.86, Ground floor, 3rd cross, New Timber yard layout, Mysore Road, Bangalore - 560 026 **(180 MTA)** 21. **M/s. Afeefa Spectro Alloys,** Sy.No.289/1, Nagaragere village, Gauribidnur Tq, Chikkaballapura Dist **(300 MTA)** 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)** 23. **M/s. E-Scrappy Recyclers,** No.106, Andrahalli Main Road, Byreshwara Industrial Area, Peenya 2nd stage, Bangalore - 560 058 **(300 MTA)**

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			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)** **25. M/s. Hindustan Computers,** No. V3 & V4, KIADB Industrial Area, Tamaka, Kolar. **(100 MTA)** **26. M/s. Trackon E-waste Recyclers Pvt. Ltd,** No.28, Gerupalya, 2nd Phase, Kumbalgodu Industrial Area, Bangalore - 560 074 **(300 MTA)** **27. M/s. Rashi E-Waste.,** No. 52/170 & 171, 6th Cross, Aziz Sait Industrial Town, Nayandahalli Post, Bangalore -560039 **(300 MTA)** **28. M/s. Rashi E-Waste Solutions Pvt. Ltd.,** SW-51, IShed No. 26, Phase II, Apparel Park, Doddaballapura, Bangalore Rural District **(Information on capacity not available at CPCB)** **29. M/s. Green Globe Enterprise,** No. 108/7, 5th Cross, Singasandra Industrial Area, Hosur Road, Bommandahalli, Bangalore-68 **(79 MTA)** **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)** **31. M/s. TES-AMM Indian Pvt. Ltd.,** No. A-365, 6th Cross, 1 Stage, Peenya Industrial Estate, Bengaluru 560058 **(12000 MTA)** **32. M/s. E-Prarisaraa Pvt. Ltd.,** Unit 2, No-P-10 (a), III Stage, Peenya Industrial Estate, Bangalore- 560058 **(300 MTA)** **33. M/s. Shobith Industry** –Unit II, Survey No. B-4/1, KSSIDC Industrial Area, Nanjangud – 571302, Mysore District **(300 MTA)** **34. M/s. XL Engineering and Fabricators,** No. B-188, 5th Main, II Stage, Peenya Industrial area, Bangalore- 58 **(34 MTA)** **35. M/s. MKK E-Waste Enterprises,** Shed No. 292, Belur Industrial Area, Belur Dharwad District, **(600 MTA)** **36. M/s. Sri Sai Company,** Plot No. Q 13, Ground Floor, Industrial Estate, Veerasandra IInd Stage, Bangalore **(300 MTA)** **37. Khanija Recycling (formerly Ambush Alied Services Private limited,** No. C-32/2, KSSIDC industrial Estate, Veerasandra, Hosur Road, Attibele Hobli, Bangalore **(Information on capacity is not available at CPCB)** **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)** **39. M/s. Moogambigai Metal Refineries,** No 89 & 90 Industrial Area, Baikampady Mangalore- 575011 **(300 MTA)** **40. M/s. KH E-Waste Recyclers,** No. 104, 1st Main Road, 4th Cross, Azeez SAit Industrial Area, Nayandahalli, Bangalore – 39 **(300 MTA)** **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 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)** 43. **M/s. Coral Communication and Networks Pvt. Ltd.,** No. 52, Hoskote Industrial Area, Bangalore Rural District **(2500 MTA)** 44. **M/s. RPN Industries,** Plot No B2, KSSIDC Industrial Area, Kumbalgodu, Mysore Road, Bangalore-74 **(Information on capacity is not available at CPCB)** 45. **M/s. Intro Tech Recyclers,** No. C-50/1, first floor, KSSIDC industrial estate, Kumbalgodu, Bangalore- 560060 **(300 MTA)** 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)** 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)** 48. **M/s. Macro Engineering Services,** No. 427-E2, Hebbal Industrial Area, Mysore- 570018 **(Information on capacity is not available at CPCB)** 49. **M/s. R. N. Traders,** Plot No. 101 Kumbalgodu village, Bengeri Hobli, Bangalore **(300 MTA)** 50. **M/s. Terra Firma Biotechnologies Pvt. Ltd.,** No. 22, Srinivasapura Village, Katenahalli, Kolalu Hobli, Kottagere Taluk, Tumkur District **(1800 MTA)** 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)** 52. **M/s. Earth Sense Recycler Pvt. Ltd.,** Industrial Plot No. Sp;. 14, Jigani 2nd stage, Jigani Village and Hobli, Bangalore-560105 **(Information on capacity is not available at CPCB)** 53. **M/s. E Pragathi Recycling,** Plot No. 66, Road No. 18, Antharasanahalli, Indl Area, IInd Phase, Tumkur. **(Information on capacity is not available at CPCB)** 54. **M/s. SLV Enterprises,** the Gachaguppe Village Kumbalagodu Post, Kengeri Hobli, Bangalore **(Information on capacity is not available at CPCB)** 55. **M/s. E-Green Recycling,** Plot No. 86-B, Jigani 1st Phase, Anekal Taluk, Bangalore **(Information on capacity is not available at CPCB)** 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 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)** **(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)** 2. **M/s. Just Dispose Recycling Pvt Ltd**, A-103,104,110,119, Arvind Industrial Estate, Navghar , Tal: Vasai, Dist: Thane **(500 MT/A)** 3. **M/s. Mercury Metal industries,** Plot no. D-48, MIDC Mahad, Tal: Mahad, Dist: - Raigad, Maharashtra. **(500 MT/A)** 4. **Sabbir Traders** Plot No.999 (7), Karivali Narayan Kutir Udyog Mandal, Village Adivali, Tal. Panval, Dist. Raigad **(500 MT/A)** 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)** 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)** 7. **E-Recon Recycling** Gat No. 94, Chitegaon, Tal: Paithan Dist : Aurangabad **(1000 MTA)** 8. **M/s. Ecocentric Management Pvt. Ltd.,** Survey No. 25, Plot No. 43, Arkose Ind Estate, Vill: Dheku, Tal: Khalapur, Dist: Raigad **(1200 MTA)** 9. **M/s. Clean Tech** B/8, Gali No. 3, Parasnath Indl. Estate, Anjur Phata Road, Village Val, Tal, -Bhiwandi, Dist.- Thane **(2000 MTA)** 10. **M/s. Arihant E-Recycling Ltd**. Gat No. 307/1, Shada Road, Dodaiacha Tal: Sindkheda Dist: Dhule **(360 MTA)** 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)** 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)** 13. **M/s. Indian Scrap Traders,** Ghusia Market, Gala no: 661 Vill: Pimpari, Post: Dahisar Dist: Thane. **(240 MTA)** 14. **M/s. Go-Green Recycling** Plot no. 32, Sec 1A , Service Industrial Area, Koparkhairne, Navi Mumbai **(240 MTA)** 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)** 16. **M/s. Suritex Pvt. Ltd.,** Plot No. B-111, MIDC Butibori, Dist, Nagpur **(360 MTA)** 17. **M/s. R. T. Corporation** S. No. 377, Hissar No: 2, Ambisi Ganeshpuri Road, Village: Palsai, Tal: Wada, Dist: Thane **(7500 MTA)**

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

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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)** 2. **M/s Greenscape Eco Management Pvt Ltd**, Unit – II F-588to 591 MIA, Alwar, Rajasthan **(60,000 MTA)** 3. **M/s K.G. Metalloys**, F-- 37-38, RIICO Industrial Area, Ondela Road, Dholpur, Rajasthan – 328 001 **(1800 MTA)** 4. **M/s. Deshwal E-waste Recycler**, G-147A, IID, Khuskhera, Tehsil Tijara, Distt. Alwar (**750 MTA)** 5. **M/s. Green Leaf Recycling Industries**, G-166-167 West part RIICO Industrial Area, Bagru (Ext.) The Sanganer Distt Jaipur **(1380 MTA)** 6. **M/s. ETCO E-Waste Recycler Pvt.Ltd.,** D-117 1st Floor Ambabari, Jaipur **(750 MTA)** 7. **M/s. Vasoo Metals (Division-III),** G-287, M. I. A. Industrial Area, Alwar-301001 **(750 MTA)** 8. **M/s. R.P. Industries**, B-81(B), RIICO Growth Centre, Odela Road, Near Bhole Baba Dairy, Dholpur – 328001 **(714 MTA)** 9. **M/s. S.B.J. & Co.,** F-137, Growth Center, RIICO Distt. Dholpur **(876 MTA)** 10. **M/s. Shukla E-Waste Processors**, B-81, RIICO Industrial Area, Bhiwadi, Tijara, Alwar. **(1200 MTA)** **(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)** 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)** 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)** 4. **M/s Ultrust Solutions (India)Pvt.Ltd.,** S.F.No.297/1B, Pappankuppam, Village : Gummidipoondi Taluk, Thiruvallur District, Tamil Nadu **(15000 MTA)** 5. **M/s INAA Enterprises, Plot No.**AC31/24, SIDCO Industrial Estate, Thirumudivakkam, Sriperumpudur, Taluk, Chennai-600 044 **(300 MTA)** 6. **M/s. AER world wide (India) Pvt. Limited**, 774, Elandhancheri, Sadayan Kuppam, village, Manali New Town, Thiruvallur Distict. **(Information on capacity is not available at CPCB)**

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			7. **M/s. SEZ Recyclers,** Acenue, Mahindra World City Develpers Ltd., Industrial Park, Thenmelpakkam, Kancheepuram District. **(Information on capacity is not available at CPCB)** 8. **M/s. Tritech Systems,** Porur Village, Ambattur Taluk, Thiruvallur Distirct **(Information on capacity is not available at CPCB)** 9. **M/s. Shri Raaam Recycling,** SIDCO Industrial Estate, Gummidipoondi, Tiruvallur Taluk & Tiruvallur Distirict **(Information on capacity is not available at CPCB)** 10. **M/s. Green R2 Re-Processors Pvt. Ltd.,** plot No. 19, TASS Industrial Estate, Ambattur, Chennai- 98 **(Information on capacity is not available at CPCB)** 11. **M/s. Abishek Enterprises.,** Ambattur Village & Taluk, Thiruvallur Dt, **(Information on capacity is not available at CPCB)** 12. **13.M/s. B.V. Enterprises.,** S.F.No 42/1, Perambakkam Road, Thandalam Village, Sriperambatur Taluk, Kancheepuram District **(Information on capacity is not available at CPCB)** 13. **14.M/s. Leela Traders.,** S.F.No41/1, Part Gudalore Village, Chengalpattu Taluk, Kancheepuram Dt. **(Information on capacity is not available at CPCB)** 14. **15.M/s. GEMS Recycling Pvt. Ltd.,** S. F. No. 222-3, Plot No. 147/A, Neervalur Village, Kancheepuram Taluk & Ditt. **(387 MTA)** **(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)** 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)** 3. **M/s. Z Enviro Industries Pvt. Ltd.,** Pulimamidi (V), Kandukur (M), Rangareddy District. 4. **M/s. Envrio Collection Centre (Dismantling Unit),** Plot No. 1-185/2/A, Sy. No. 298 Part, Phase-I, IDA, Jeddimetla, Rangareddy District. **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)** 2. **Mahaluxmi metal Alloys (India) Pvt. Ltd.,** Modinagar, Ghaziabad **(600 MTA)** 3. **M/s. N.K. Products,** 58-59, M. G. Road, Ghaziabad **(9000 MTA)** 4. **M/s Bharat Oil Co.**E-18, Site – IV, Sahibabad, Industrial Area, Ghaziabad **(4000 MTA)** 5. **M/s Plant Green Recycling Pvt. Limited, G-**129, Phase – I , M.G. Road, Ghaziabad **(1500 MTA)** 6. **Rocket Sales,** Plot No. 1-12, I/A, M. G. Road, Hapur **(300 MTA)** 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 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)** 9. **M/s. Sims Recycling India Pvt. Ltd.**, S. D. F. J5-6, NSEZ Noida **(1000 MT/A)** 10. **Halcyon Electrotech Pvt. Ltd.**, Plot No. – 118, Udyog Kendra -2, Ecotech -3, Greater Noida **(660 MTA)** 11. **Intarvo Formulae Recyclers Services Pvt. Ltd.**, B-45, Sector-80, Phase-II, Noida **(7000 MTA)** 12. **M/s. TIC Group India Pvt. Ltd.**, J. 2& J-6, SDF, Block- 1, NSEZ, Noida **(1000 MTA)** 13. **Auctus Recycling Solutions Pvt. Ltd**, Habibpur, Greater Noida **(20000 MTA)** 14. **M/s. Khan Traders**, B-5, Site No. 4, Panki Ind. Area, Kanpur **(7190 MTA)** 15. **Green Tech Recycling**, Khasra No. 645, Acchraunds, Bahdurpur Road, Partapur, Meerut **(1800 MTA)** 16. **Narora Atomic Power** Station, Narora, Bulandshahar **(10 MTA)** 17. **M/s. E-Waste Recyclers India**, E-50, UPSIDC Industrial Area, 98Km Stone, NH-2, Kosi Kotwan, Mathura **(6000 MTA)** 18. **M/s. J. A. O. E-Waste Recycling Company**, Jaitpur, Kashipur Road, Moradabad **(300 MTA)** 19. **M/s. Oasis Eco E-Waste Recycling**, E- 160, UPSIDC, Ind. Area, Halilabad, Santkabirnagar Uttar Pradesh **(720 MTA)** 20. **M/s. Hin Green E-Waste Recycling Pvt. Ltd.**, B-19/1 Samar Garden, Meerut Uttar Pradesh **(750 MTA)** 21. **M/s. Hayat-E-Recyclers Pvt. Ltd., Plot No.** E-53& 54, M. G. Road Indl. Are, Hapur Uttar Pradesh **(3000 MTA)** 22. **M/s. Prakesh Metal House**, 39/223-224, Karwan, Alamganj, Loha Mandi, Agra Uttar Pradesh **(1500 MTA)** **(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)** 2. **M/s. Bharat Oil and Waste Management Ltd**. Mauza Mukimpur, Roorkee-Lakshar Road-Roorkee Dist. Haridwar- 247664 **(10000 MTA)** 3. **M/s. Resource E-Waste Solutions Pvt. Ltd.**, F-97 Industrial Area, Bhadrabad Dist Daridwar **(6000 MTA)** **(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** **Note:- Information on capacity of some of the units are not available at CPCB**

Annex 7: 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. The Acts and Rules made thereunder shall be read including all amendments till date. The manufacturers shall produce necessary documentation for compliance with requirements of these Rules to the procuring agency. 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. 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 No manufacturing facility shall export or import ozone-depleting substances, equipment, or instruments to any country. 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. 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
2.	Corporate social	Comply with Corporate Social	Certification (self or third

No.	Organizational criteria	Requirement for RAC manufacturers	Certification /submission needed
	responsibility	Responsibility Norms as per the Rules and Provisions under the Company Act and revised from time to time	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 Revised /IEC 60335-2-40** (under preparation) and all other requirements specified in this standard	Certification (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 notified under the Environment (Protection) Act, 1986 from time-to-time but not more than the limits specified under the standard issued by BIS **(IS 1391 Revised)**	Certification (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. The refrigerant should have **Zero ODP**. The Global warming potential **(GWP) not exceeding 750** (100 years)[17] is recommended till a specific directive is issued by MoEFCC	Certification (self or third party) for compliance to be provided to the procuring agency
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 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.**	Certification (self or third party) for compliance to be provided to the procuring agency

[17] 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.