

A Study on Feasibility of Ecolabeling Program in India

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Glossary

AC	Air Conditioner
BEE	Bureau of Energy Efficiency
BIS	Bureau of Indian Standards
CFC	Chlorofluorocarbons
CO ₂	Carbon Dioxide
EEB	European Environmental Bureau
EU	European union
GECA	Good Environmental Choice Australia
GHG	Green House Gas
GoI	Government of India
GWP	Global Warming Potential
HCFC	Hydrochlorofluorocarbon
HFC	Hydrofluorocarbons
ISHRAE	Indian Society of Heating, Refrigerating & Air-conditioning Engineer
LCA	Life Cycle Assessment
LCCP	Life Cycle Climate Performance
MEPS	Minimum Energy Performance Standards
MGI	McKinsey Global Institute
MoEFCC	Ministry of Environment, Forest & Climate Change
ODP	Ozone Depletion Potential
UNEP	United Nations Environment Program

Executive Summary

Several governments and businesses across the globe have shown an increasing concern for environmental protection that have led to a growth in sustainable consumerism. Potential threats to the environment, arising as a result of ozone depletion, urban waste generation, and pollution, have pushed for increase in the number of ecolabeling schemes around the world and led to a growth in green consumerism.

The Government of India (GoI) has made considerable efforts to promote the uptake of environmentally-friendly and sustainable products and services. Government's Bureau of Energy Efficiency (BEE) is responsible for enhancing the energy efficiency of appliances, and the Bureau of Indian Standards (BIS) is tasked with safety, quality and performance parameters of products. Another such effort was the *Ecomark* scheme which was instituted by the Ministry of Environment and Forests and Climate Change (MoEFCC) on labeling of environment friendly products. However, it could not gather the required momentum due to several implementation challenges.

Recognizing the need to factor in overall environmental footprint associated with products and encourage the penetration of environmentally-friendly products in the market, this study assess the feasibility of developing a comprehensive ecolabeling program in India, and focuses on its applicability on cooling appliances. An ecolabeling labeling criteria for cooling appliances is thereby proposed in this study that can provide information to consumers about the environmental footprint of the product, and enable them to make appropriate and informed choices. This program can also potentially help drive technology innovation for improved cooling appliances and transform the markets and increase access to environmentally friendly products.

Through detailed consultations with industry and government representatives, the report provides an overview of existing legislation, initiatives, and frameworks relevant to the introduction of ecolabeling in India. Additionally, it reviews the global experience of eco standards, policies, and labels. It also reviews best practices for certification processes, consumer awareness and information dissemination. Stakeholder discussions were also held as part of the study to explore feasible approaches to introduce the program in the Indian market, and the plausible roles and responsibilities of various entities. Subsequent discussions and follow-up resulted in inclusion of Ecolabeling as a key recommendation under the *India Cooling Action Plan*, which paves the way forward for further work and development of ecolabeling policy and implementation plan.

The key finding of the study demonstrates that it is feasible to reintroduce the ecolabeling program in the country with certain improvements in the existing *Ecomark* scheme and learnings from other global labeling schemes. The report also enlists the benefits of ecolabel, its relevance in the Indian market and implications on international trade. The ecolabeling scheme proposed in the study has the potential to become a market standard, and be widely accepted by consumer groups. The push for an environmental labeling program, beginning with cooling equipment, can also aid consumers in cutting back on energy bills, improving performance of such equipment, extending the lifespan and usefulness of these appliances, and achieving indoor thermal comfort.

By presenting a favorable case for developing an ecolabeling scheme in India, the study recommends that the ecolabeling scheme must be integrated with ongoing standards & programs such as the Refrigerant phase-out, India Cooling Action Plan, Building Codes, etc. It suggests that a supportive policy and regulatory framework must be created that can include environmental performance target. Further, the ecolabeling framework will have to be designed in a way to potentially include other sectors and product types in the future. The study also recommends the revival of the existing *Ecomark* program, and widen its scope to include cooling appliances.

01 Introduction to Ecolabeling

Ecolabeling is a method of environmental performance certification and labeling that is practiced around the world. An ecolabel identifies products or services proven environmentally preferable overall, within a specific product or service category.¹ It measures the total environmental impact of a material or product, and assesses the environmental performance of the product or material within its specific product category². It follows the life cycle methodology; it measures the environmental footprint of the product through its life cycle.

Ecolabeling effectively identifies and establishes markets for green and efficient products, and fulfills three primary objectives: environmental protection, encouragement of innovation in the environmental and efficiency sector, and consumer engagement. Ecolabeling programs and schemes are typically backed by national and international governmental agencies, and the primary stakeholders of any ecolabel are the government, industrial associations, consumers, scientific agencies, and not-for-profit organizations.

Ecolabels have, historically, aimed at identifying and promoting products that have a reduced environmental footprint as compared to other similar products. They encourage a move towards eco-friendly consumption patterns, and provide incentives to governments, manufacturing entities, and consumer organizations to adopt sustainable best practices.

Types of Ecolabel

Currently, there are three broad types of environmental/ecolabels that exist, as described below:

Type 1 – A voluntary program that grants a license after a thorough analysis of the overall environmental performance of the product under consideration. This type is voluntary, multiple-criteria based, third party assessed program, and awards a license, which authorizes the use of environmental labels on products indicating overall environmental preference for a product within a product category based on life cycle considerations.

Type 2 – This involves self-declaration forms, which cover a wide variety of environmental criteria

Type 3 – Voluntary programs that provide quantified environmental data of a product, under pre-set categories of parameters set by a qualified third party and based on life cycle assessment, and verified by that or another qualified third party.

Ecolabeling Terminology

The key words in formulating an ecolabeling program include **sustainability**, **responsibility**, and **ethical purchasing behavior**. These can be ensured by instituting verification processes, which involve an ecolabel certification. A few relevant elements include the following:

Sustainable Production: Ecolabeling aims at developing environmentally-conscious design and manufacturing processes that will not jeopardize the ability of future generations to benefit from the full range of available natural resources.

Responsibly-managed: This is an important step to promoting sustainability using ecolabels. It involves an obligation on the part of the certifying parties to minimize or eliminate the environmental footprint of a particular product by incorporating actions that will contribute to maintain triple-bottom line sustainability.

Responsible Purchasing Behavior: Ecolabels and certified parties must make attempts to define and apply ethical sourcing policies. They must attempt to raise awareness about resource usage and engagement with activities designed to promote environmental conservation, which will trigger sustainable purchases.

Performance Framework: Key elements of an ecolabeling program will be assessed for life cycle sustainability, and these assessments will form part of a performance matrix that provides specific qualitative and quantitative characteristics of a particular product. The robustness of a performance network can be reinforced through expert development, public consultation, peer review, and ongoing research and development.

¹ “What is Ecolabelling?”; Global Ecolabelling Network

² Ibid.

Key benefits of Ecolabeling

Ecolabeling program offers a multitude of benefits as detailed below:

Market transformation towards environmentally friendly products: The implementation of an Ecolabeling program encourages the penetration of environmentally-friendly products in the market, and educates consumers about the environmental and economic benefits of purchasing green products. Therefore, it fosters a change in buying patterns, and gradually rids the markets of inefficient, environmentally-harmful products.

Informing consumer choice: The program will help inform decision making for consumers and may aid the uptake of environmentally-friendly and efficient appliances.

Promoting economic efficiency: The advent and popularization of ecolabeling will help manufacturers and industrial bodies streamline their processes and systems, which in turn, could potentially help cut costs and improve efficiencies. Adhering to the mandates of an ecolabel helps manufacturers integrate environmental responsibility into their processes; therefore, the cost of adhering to governmental regulatory controls is minimized overtime.

Encouraging continuous improvement: All products labeled under an Ecolabeling scheme are required to maintain a high standard of environmental performance, and continuously evolve to comply with new regulations and standards.

Encouraging research and innovation within the sustainability sector: The institution of a comprehensive Ecolabeling program aids research and innovation, which will in turn result in more efficient manufacturing and production processes, sustainable disposal practices, and improved recycling methodologies.

Ensuring sustained environmental performance: Most Ecolabeling programs and schemes have in place a robust monitoring, evaluation, and learning system, which helps maintain the environmental performance of the labeled products.

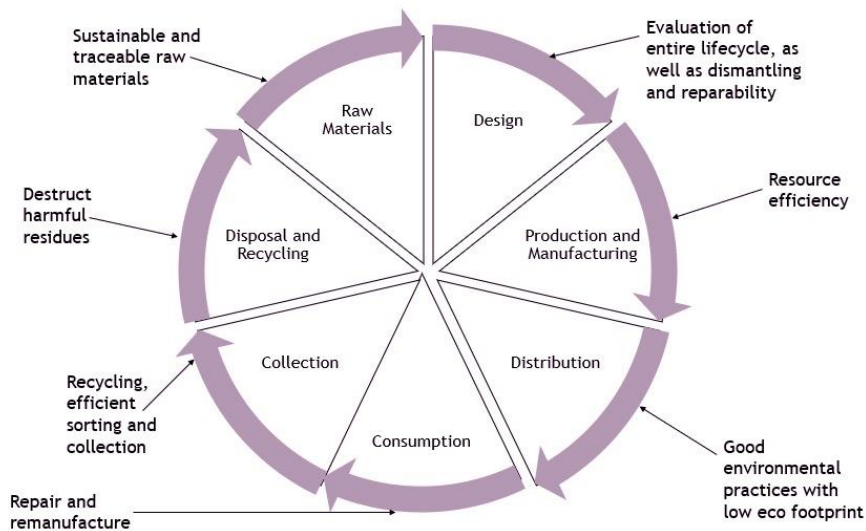
Energy Independence and Security: Environmentally-compliant facilities reduce dependence on fossil fuels, which increases independence and security and mitigates the prevailing energy crisis.

Ecolabeling as a tool for sustainable economy

Ecolabels furthers the concept circular economy of resource, as shown in a study by the Global Ecolabeling Network illustrated below. The key parameters of the ecolables are:

- Sustainable raw material extraction
- Environmentally-conscious design
- Integration of efficiency within design and manufacturing
- Ecologically-friendly consumption practices
- Sustainable packaging and distribution
- Environmentally-friendly operations and maintenance activities
- Recycling procedures adopted wherever possible
- Redistribution/reuse of products
- Sustainable disposal

Figure 1: Key parameters of Ecolabel



Ecolabeling, as a process, strongly emphasizes on transparency, as evidenced by the certification methodologies of the various existing ecolabels around the world. These programs are often viewed as a platform for manufacturers to facilitate the differentiation of greener products from other conventional ones. The three primary goals to be achieved through the proposed ecolabel are:

- 1) Encourage the process of *ecological bookkeeping*,
- 2) Implement a value tax, and
- 3) Repair the damage caused by previously adopted ecologically damaging practices.³

Figure 2: Process of Customer Choice on Purchasing Environmentally Friendly Products (Bui, 2005)



A growing global concern for environmental protection by various governments and businesses led to a growth in sustainable consumerism, which pointed toward the need for more dissemination of environmental performance knowledge among the product manufacturers and retailers. Potential threats to the environment, arising as a result of ozone depletion, urban waste generation, and pollution, have pushed for increase in the number of ecolabeling schemes around the world.

International Experience of Ecolabeling

A review of ecolabels around the world suggests that environmental performance of products is increasingly being given importance, and environmental aspects do play a vital role in shaping consumer choices. Recent studies have also shown that consumers are willing to pay a premium for enhanced environmental performance.

³ “Three Steps to a Sustainable Economy”; Eckart Wintzen; May 2012; The Solutions Journal

The first Ecolabeling program, called *Blue Angel*, was instituted in Germany in 1978⁴. The *Blue Angel* label measures the environmental impact of a product by calculating the fossil fuel consumption, greenhouse gas

emissions, and other resource depletion. This label attempted at assessing the technological and design developments for several product groups, and an above average performance rating was required to award the label.

A plethora of eco and environmental labels were thereafter introduced within several developed and developing countries. In a typical Ecolabeling program, product categories and Ecolabeling criteria are determined by an independent, third party organization, with assistance from one or more technical advisory groups.

Currently, the most prominent international ecolabel is the European Eco-Label Scheme. This scheme serves 135 companies, and has awarded labels to 21 product groups, ranging from paints, detergents, and refrigerator, to tourist accommodations.⁵ The label is extremely popular among industrial associations and consumers, and is expanding to include a wider range of products and services.

All ecolabels currently being implemented do not focus on a common impact parameter. On the contrary, there exist several types and categories of labels that place an emphasis on specific categories. However, all ecolabels adhere to a set of guiding principles to ensure credibility and effectiveness – these principles stress on holistic performance, compliance with existing legislations, a sound scientific and engineering base, exceptional leadership, credibility, attainability, and measurability, independence, and flexibility.

Figure 3: A snapshot of a few existing national and international ecolabels⁶



Many existing labels typically focus on one particular impact category (for example, air quality, water consumption, energy consumption, etc.) and include a single sector (for example, appliances, tourism, building products, textiles, etc.).

Key learnings from global Ecolabeling programs

The environmental aspects of cooling products play a significant role in enhancing the popularity of a particular product. The following characteristics were found to be of particular importance:

- Minimal air, water, and noise pollution potential
- Safety of operation
- Lower energy and other resource consumption
- Minimal toxicity
- Durability

⁴ “Sustainability Concepts”; grdc.org

⁵ “The Importance of Eco-Labeling”; Duncan Stewart; European Commission

⁶ “Types I, II, and III of Ecolabels”; Rusko et al.; November 2013

Consumers preferred the following sources of communication for information on environmental performance of products:

- Governmental announcements
- Newspapers
- Television
- Information facilities
- Publications/technical journals
- Conferences/public gatherings
- Internet

The review study also shows that:

- Product labels play an important role in consumers' decision making for product purchase;
- The vast majority of population believes that an ecolabeled product complies with all required environmental regulations;
- A rating system similar to BEE's star labeling program is preferred by consumers, so as to accurately gauge the level of environmental performance and efficiency;
- Integrating the requirements of an ecolabel with existing local and international environmental regulations is preferred;
- Environmental management systems are a useful feature within manufacturing facilities;
- Consumers view a product with visible environmental aspects more positively than others; and
- Most consumers agree that an ecolabel for cooling appliances is useful, and they would prefer buying ecolabeled products.

The review also demonstrates that the following are the ideal characteristics of an ecolabel:

- Is a voluntary program;
- Connects to existing environmental regulations and laws;
- Incorporates within existing experiences, networks, and structures;
- Takes into account local characteristics;
- Does not discriminate against smaller manufacturing facilities and enterprises;
- Encourages periodic environmental performance monitoring;
- Focuses on widespread dissemination of its criteria, increases awareness of the program among the public; and
- Incorporates social equity.

02 Overview of Indian Market

The introduction of ecolabeling schemes and standards in several countries around the world has led to a growth in green consumerism. However, it has been observed that several of these schemes also possess a string of drawbacks and potential areas of improvement. Developing countries, in particular, have initiated discussions on the impact of these schemes and standards on various products' market accesses – the primary concern behind the institution of such schemes is that these could add an additional layer of constraints, which could, in turn, detract the product(s) or manufacturers from entering regional and global markets. It has been projected that ecolabeling programs could attract capital investment and joint ventures in developing nations.

Ecolabeling is seen as an entryway into premium markets: for manufacturers willing to adhere to high environmental standards, such programs present a valuable opportunity to differentiate themselves from other manufacturers, and maintain a competitive market share. The uptake and growth of ecolabeled products will foster the growth of new markets for such eco-friendly products, and this will, in turn, attract investors, and bolster partnerships between nations to develop mechanisms to adhere to high environmental standards.

The Indian Consumer

India is going through a period of rapid economic growth, and this has led to the country's consumers to considerably alter their spending habits. A study by the McKinsey Global Institute (MGI)⁷ predicts that if India's current growth rate is maintained, average household incomes will triple over the next two decades, and the country will become the world's 5th largest consumer economy by the year 2025. This rapid growth rate will also spur further changes in spending patterns, and consumer goods sales are expected to grow exponentially.

A drastic change in current economic patterns has also been predicted, as India is expected to witness a dramatic shift from an unorganized, informal economy to a more formal and organized one⁸, and this will provide further impetus to the growth of the consumer goods market.

Consumer Durables Market: Trends and Projections

The Indian consumer durables market has been defined as a “high-spend, priority” sector, and accounts for over 40% of the total consumer spending amount in India.⁹ This sector is a major employer, and has an annual turnover of over INR 500 billion, contributing over INR 150 billion to national revenue.

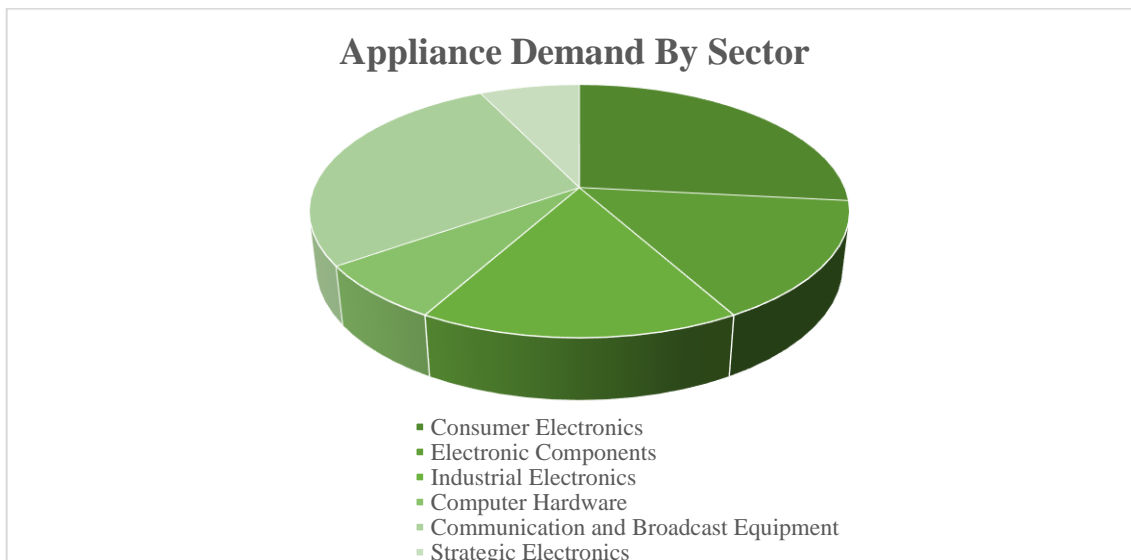
Contrary to other products and services in the market, which are accelerating toward local manufacturing and production, the consumer electronics and durable goods market largely remain driven by imported products. However, there exists great potential for large-scale expansion of local manufacturing facilities for these product types, which is gradually being tapped into.

India's population and standard of living are on an upward trend, with significant increases being witnessed in both sectors. A growing demand for household appliances, and a recent boost to the local manufacturing economy, has accelerated the growth of the country's consumer durables sector. Additionally, it has been predicted that large-scale expansion in production will be necessary to meet growing demand – several major manufacturers have already made significant investments in this regard. Consumer electronics and communication equipment are in the highest demand, followed by industrial electronics and electronic components⁸.

⁷ “Tracking the growth of India's middle class”; Beinhocker *et. al.*; The McKinsey Quarterly (2007-3)

⁸ “An Overview of Eco-Friendly Products”; Shivaji University, Kolhapur

Figure 4: Appliance Demand by Sector (Ernst and Young, 2015)



The market for energy efficient products is expected to gain significant ground, and more stringent energy efficiency and sustainability norms are expected to be instituted and supported by the Government of India. The energy-efficient AC market as a whole is expected to constitute 7-8% of the total AC market by 2020.⁹

Companies and industry associations are formulating innovative pricing mechanisms and payment methods, such as incentives and EMIs, to encourage widespread uptake of energy efficient cooling appliances. This is expected to be accelerated with the use of better technology, as well as on the willingness of manufacturers to waive installation charges and other miscellaneous expenses on the purchase of a high-performing cooling appliance.

Air Conditioner (AC) Market

The AC market constitutes a multitude of large and small players, the most notable of Indian manufacturers which includes Voltas, Blue Star, Godrej, Videocon, Onida, etc. and several overseas manufacturers such as Daikin, Samsung, LG, Hitachi, Panasonic, etc. The AC market in India has been growing faster than the other sectors, at an average rate of 18-20% over the last decade.¹⁰ The market includes window ACs, high wall splits, floor and ceiling mounted units, inverter ACs, and packaged units.

According to research by Indian Society of Heating, Refrigerating & Air-conditioning Engineer (ISHRAE)¹¹, Indian consumers are increasingly opting for energy efficient products, and products with a lower environmental footprint. The Bureau of Energy Efficiency (BEE)'s Star Labeling program has increasingly gained in 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.

Owing to a radical shift in Indian consumers' preferences, and the increasing focus on energy efficiency and sustainability, there exists intense competition among AC manufacturers and retailers to draw up competitive pricing strategies while maintaining high levels of energy and environmental efficiencies.¹²

⁹ "Study on Indian Electronics and Consumer Durables Segment (AC, Refrigerators, Washing Machines, TVs); Ernst and Young; April 2015

¹⁰ Business Standard – "Consumers switch to inverter ACs as energy efficiency gains ground"; September 2013

¹¹ ISHRAE – Air Conditioner Market in India; September 2015

¹² Economic Times – "LG moves towards high end, energy-efficient ACs"; January 6, 2017

Existing Labeling Programs in India

The Government of India has made considerable efforts to promote the uptake of environmentally-friendly and sustainable products and services. One outcome of these efforts was the *Ecomark* labeling program, which has been described in detail in the following pages.

Additionally, a few Indian and international labels related to energy and/or environment currently in use are detailed below.¹³

Table 1: Labels Currently Used in India

<p>BEE Energy Efficiency Labeling (India)</p> 	<p>EcoCert (Brazil, Canada, USA, India, France, South Africa, Spain, Turkey)</p> 
<p>Forest Stewardship Council (FSC) Chain of Custody Certification (China, Denmark, France, Germany, Japan, Malaysia, Netherlands, India, Italy, South Africa, USA)</p> 	<p>Good Weave International (Germany, India, Nepal, UK, USA)</p> 
<p>Green Globe Certification (Austria, France, Germany, China, India, Malaysia, Singapore, Netherlands, South Africa, UK, USA)</p> 	<p>India Organic (India)</p> 

¹³ "An Overview of Eco-Friendly Products"; Shivaji University, Kolhapur

UPS Carbon Neutral
(Australia, India, Germany, Brazil, Canada, China, South Korea, Japan, Spain, Thailand, UK, USA)



The Green Signal (India)



Ecotel Certification (India)



Fair Trade (Argentina, Brazil, Chile, Mexico, South Africa, India)



Better Cotton Initiative (Australia, China, India, Pakistan, Turkey, USA)



Global Organic Textile Standards (UK, India, Spain, Germany, France)



India's 'Ecomark' scheme

The Ministry of Environment and Forests and Climate Change (MoEFCC), Government of India instituted 'Ecomark' scheme on labeling of Environment Friendly Products through Gazette Notification No. 71 dated 21st February, 1991. The scheme is operating on a national basis and provides accreditation and labeling for household and other consumer products that meet certain environmental criteria along with quality requirements of the Indian standards for that product. The scheme is voluntary and invites participation from common citizens and concerned industrial sectors in the larger interest of environment. The program awards labels to products that follow a set of stringent environmental requirements, and ensures that the certified products undergo a set of robust tests, in accordance with relevant Indian standards and regulations, to validate the *Ecomark* certification.

Concept

Ecomark is based on a complete life cycle assessment and analysis, and adopts a cradle-to-grave approach. The label measures the environmental footprint of a product right from the raw material extraction stage, through the manufacturing and consumption stages, and the disposal stage. The criteria for eco-evaluation of the product(s) under consideration depend on several other product-specific aspects; for example, all products certified under this program must have significant potential to mitigate pollution, must comprise a considerable percentage of recycled content, and minimize non-renewable resource consumption, among others.

The main objectives behind the institution of the *Ecomark* labeling program were to encourage the consumption of environmentally-friendly products, educate manufacturers and consumers about the environmental impacts of several product types, provide incentives to mitigate the harmful effects of environmental degradation, and improve the overall quality of the environment and ensure long-term sustainability.¹⁴

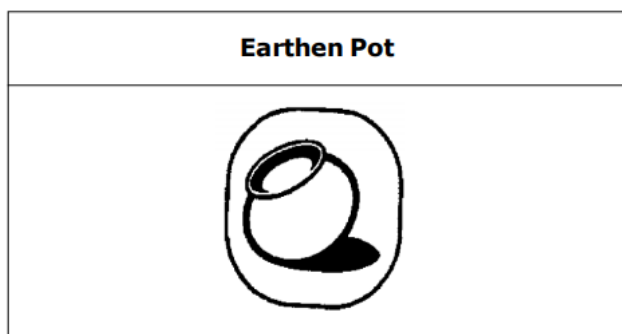
¹⁴ Ministry of Environment and Forests; Department of Environment, Forests, and Wildlife; Resolution dated 20 February 1991

The *Ecomark* labeling program for a product ensures that:

- (a) It has substantially less potential for pollution than other comparable products in production, usage and disposal.
- (b) It is recycled, recyclable, made from recycled products or biodegradable, where comparable products are not.
- (c) It makes significant contribution to saving non-renewable resources, including non-renewable energy sources and natural resources, compared with similar products.
- (d) The product contributes to a reduction of the adverse primary criteria which has the highest environmental impact associated with the use of the product, and which will be specifically set for each of the product categories.

Ecomark Scheme Logo

Figure 5: *Ecomark* scheme logo



The program logo is an earthen pot, which symbolizes the use of renewable resources and the protection of biodiversity.¹⁵ The logo attempts at epitomizing environmental conservation, and promotes environmental awareness among the public.

The label measures the following to determine the environmental performance of a product, and varies these parameters based on the product type:

- (a) Production process including source of raw material;
- (b) Natural resource consumption;
- (c) Likely impact on the environment;
- (d) Energy conservation in the production of the product;
- (e) Effect & extent of waste arising from the production process;
- (f) Disposal of the product and its container;
- (g) Utilization of "Waste" and recycled materials;
- (h) Suitability for recycling or packaging;
- (i) Biodegradability

Ecomark Certification Process

Under this program, manufacturers can apply for certification under the respective product categories, and document their compliance with the set environmental criteria in the prescribed format. The testing and certification processes are carried out by the BIS, and based on the results; the products are awarded or denied a label. The certification is generally prescribed for a period of one year, after which a license fee will have to be paid by the manufacturers to continue to operate their licenses. For the operation of *Ecomark* scheme, BIS is also responsible for the following:

- Assessment of the product for *Ecomark*, certification of the product for award of *Ecomark*.
- Renewal, suspension and cancellation of the license.
- Products certified as eligible for the *Ecomark* shall also carry the ISI Mark (except for leather) for quality, safety and performance of the product and shall be licensed to carry the *Ecomark* for a prescribed time period after which it shall be reassessed.

¹⁵ N S Raman, A P Singh, and U P Waghe; "Ecomark Scheme in India"; International Journal of Pharma Medicine and Biological Sciences; October 2012

- Undertaking inspections and taking samples for analysis of any material or substance in relation to which the BIS - *Ecomark* has been used as may be necessary for proper implementation of *Ecomark*. For this purpose, the Standard Mark of Bureau would be a single mark having a combination of the ISI Mark and the ECO Logo

Products and Product Categories Covered Under *Ecomark*⁹

Table 2: Current Household Appliances Covered Under *Ecomark*¹⁶

SR.NO.	APPLIANCE TYPE	INDIAN STANDARD
1	Tubular Fluorescent Lamps	IS 2418 (Part 1)
2	Electrical Iron	IS 366
3	Steam Iron	IS 6290
4	Immersion Water Heater	IS 368
5	Electric Radiator	IS 369
6	Electric Stoves	IS 2994
7	Ceiling Fans Including Regulators	IS 374
8	Pedestal Fans	IS 1169
9	Table Fans	IS 555
10	Exhaust Fans	IS 2312
11	Geysers	IS 2082
12	Electric Toasters	IS 1287
13	Refrigerators	IS 1476
14	Colour Televisions	IS 10662
15	Black and White Televisions	IS 4547
16	Food Mixers	IS 4250
17	Instantaneous Water Heaters	IS 8978

The first *Ecomark* label was awarded to "Ezee", a liquid detergent manufactured by Godrej.

The *Ecomark* scheme covers 16 broad product categories: including, but not limited to, food, medicines, chemicals, electronic goods, paper, lubricating oils, and packaging materials. This list does not include household appliances or cooling equipment.

Ecomark Program Governance Structure

As per the Government of India's notification for *Ecomark*, the implementation of the scheme is managed by specially constituted committees, which are as follows-

1. Steering committee – This committee is set up within MoEFCC to determine the product categories for coverage under the scheme and formulate strategies for promotion, implementation, future development and improvements in the working of the scheme. The functions of the Steering Committee are as following:-

- (a) Selection of logo for *Ecomark*.
- (b) Activities related to creation of mass awareness for promotion and acceptance of the scheme.
- (c) Determining the product category to be taken up under the scheme.
- (d) Coordinating ways of ensuring that industry is actively involved in the scheme.
- (c) Securing the involvement of other Ministries, Government Departments, Industry Associations and other Non-Governmental Organizations and Consumer Organizations.

¹⁶ ENVIS Centre on Environment Literacy – Eco-labelling and Eco-friendly Products, MoEFCC

-
- (f) Formulations of strategies for future development of the scheme.
 - (g) Identifying institutions in India or outside which are engaged in the standardization of any article or process or improvement of quality of any article or process and recommending assistance to build consumer awareness.
 - (h) Promoting programs of comparative testing of products by Consumer Organizations and dissemination of results to the general public.
 - (i) Supporting any research for the formulation of *Ecomark* products in the interest of Consumer groups

2. Technical committee - Constituted by the Central Government, set up in the Central Pollution Control Board, this committee is tasked to identify the specific product to be selected and the individual criteria to be adopted, including, wherever possible, inter-se priority between the criteria if there be more than one. The functions for the Technical Committee are as following -

- (a) Identification of specific products for classifying as environment friendly.
- (b) Reviewing the existing state of knowledge and the environmental criteria being followed in other countries.
- (c) Recommend the most appropriate criteria and parameters to designate various products as environment friendly, including the most important criteria or individual products that have been specified for the purpose and their inter-se priority, whenever possible.
- (d) Review the various technologies available for determining the criteria.
- (e) Recommend various laboratories and analysts for product assessment in the Ministry of Environment and Forests.
- (f) Evaluation of the environmental impact of the products and criteria from time to time.
- (g) To review from time to time the implementation of the schemes by the Bureau of Indian Standards (BIS), including the sample inspections done by the body.
- (h) Set up sub-committees for each product category if so required, including formulation of test programs for comparative testing of products by consumer organizations.
- (i) The technical committee may set up expert panels to advise it for specific products.

3. The Bureau of Indian Standards (BIS) - Responsible for the implementation of the scheme, the BIS also has the power to withdraw the label if the product fails to comply with the relevant environmental regulations in the subsequent years following certification. Functions of BIS are as below -

- (a) Assess the product for *Ecomark*, certify the product for award of the *Ecomark*;
- (b) Review, suspend, or cancel a license, for the use of the *Ecomark*;
- (c) Mark inspections, and take such samples for analysis of any material or substances as may be necessary to see whether any article or product in relation to which the *Ecomark* has been used, conforms to the contract or whether the *Ecomark* is improperly used in relation to any article or process with or without a license;
- (d) Period of award - The label shall be awarded for a minimum period of one year and shall roll forward annually. The time period of the award may be reviewed from time to time.
- (e) Criteria for *Ecomark*
- (f) Certification and Licensing
- (g) The Logo
- (h) Consumer Awareness

Barriers to Implementation of the Current Ecomark Program

The response to the current *Ecomark* labeling program has been lukewarm – several manufacturers and industrial associations are not inclined toward applying for this certification. A few of the reasons are as listed below:

1. The primary reason for this phenomenon, as stated within the study by N S Raman *et al.*, is the fact that this program follows a self-financing model, and does not provide financial incentive to interested parties. Additionally, the initial certification costs for the program are not guaranteed to pay back within a feasible time frame.
2. Certifying products are also required to comply with an additional layer of BIS regulations, which adds to the quantum of documentation to be prepared and submitted for certification purposes.
3. *Ecomark* program does not cover any major export product categories, and the current set of environmental performance measurement regulations lacks comprehensiveness.
4. It has been noted by several industrial organizations that the program lacks transparency. The level of dissemination of information to concerned parties has to be drastically improved.
5. The level of public literacy and awareness about the program is significantly low.

03 Ecolabeling Program Feasibility

Stakeholder Consultations

In order to assess the feasibility of an ecolabeling program in India, strategic consultations were done with key agencies involved in standards, labeling, and environmental policies in the country. These include the Bureau of Indian Standards (BIS), Bureau of Energy Efficiency (BEE), Ministry of Environment, Forest, and Climate Change (MoEFCC), and United Nations Environment Program (UNEP). The purpose of the consultation was to introduce the concept of ecolabeling, understand the barriers and explore opportunities for integrating ecolabeling with the current ongoing programs, if possible. A summary of these discussions is given below.

Bureau of Indian Standards (BIS) is the nodal agency for implementing the existing 'Ecomark' program. Multiple consultations were held with the BIS officials to get a feedback on the experience of the *Ecomark* program and to seek opinion on the feasibility of the proposed comprehensive Ecolabeling concept. These consultations were positive, and the officials at the BIS were supportive of the concept. They endorsed the proposed approach of expanding the scope of the existing *Ecomark* program for greater coverage and uptake. BIS was also keen to play the role of the nodal technical, standard setting, and testing agency for the expanded Ecolabeling program.

Further, BIS was open to idea of initiating the program with integrating ecolabeling criteria within the existing standard for air-conditioners and other cooling appliances. The room air conditioner standard is under revision and it would be possible to introduce additional criteria at this stage. Some of the key environmental criteria for cooling appliances and equipment are global warming potential, human toxicity, emissions, and energy consumption.

A final presentation was made to the BIS staff at a knowledge-sharing workshop. The title of the presentation was "ECO labeling in India and its application on Room Air-conditioners". Participants in the workshop endorsed the concept and gave valuable feedback on making the program more effective.

Ministry of Environment, Forest, and Climate Change (MoEFCC) is the nodal ministry with the mandate of implementing the current *Ecomark* scheme. A presentation on the concept of ecolabeling and its benefits, focusing on cooling appliances, was delivered to MoEFCC officials.. The Ministry was interested and supportive of the concept, and also approved the idea of building on the existing *Ecomark* program – where MoEFCC can create a broader implementation framework. MoEFCC also supported the idea of BIS as the institution responsible for the roll-out and overall administration. A follow up meeting was held with MoEFCC to discuss potential challenges, and to draft a detailed action plan for the implementation of Ecolabeling.

As result of this feasibility study and extensive support generated, MoEFCC agreed to the concept of Ecolabeling as being the key to a consumer centric approach for efficient and sustainable cooling for India. Subsequent discussions and follow up resulted in MoEFCC accepting to include Ecolabeling as a key recommendation under the **India Cooling Action Plan** which paves the way forward for further work and development of action plan.

India Cooling Action Plan: Short-term Recommendations

1. *Implement Eco-labeling programme for cooling appliances in India The environmental footprint of cooling equipment in terms of GWP (or ODP), GHG emissions, should be factored in combination with safety, performance, and energy efficiency, under a single eco/environmental label.*
2. *Add cooling appliances under MoEF&CC, Government of India's 'Ecomark' scheme on labeling of environment friendly products.*

Figure 6: Excerpt from **India Cooling Action Plan - Recommendations & Way Forward**

B Accelerate (i) reduction of the cooling load of the building sector through fast-tracked implementation of building energy codes, (ii) adoption of adaptive thermal comfort standards, (iii) ratchet-up energy efficiency of room air-conditioners and fans, and (iv) enhancing consumer awareness through eco-labelling of cooling products: In the light of significant increase (~3x) in building area by 2037-38 (over 2017-18 baseline), the role of climate appropriate design and building energy efficiency will become increasingly important in terms of reducing the cooling load requirements.

United Nations Environment Program (UNEP): As a key partner to the Government of India, UNEP has been supporting implementation of sustainable public procurement aimed at advancing sustainable consumption and production. Discussions with UNEP strengthened the feasibility concept and approach for India and they also stressed the importance of this concept for establishing transparency and compliance for environmental benefits. They suggested that the proposed criteria also focus on climate change mitigation and appliance disposal mechanisms.

Bureau of Energy Efficiency (BEE): Discussions were held with BEE and although BEE is overall supportive of Ecolabeling, but they see their mandate limited to energy related criteria only. Therefore BEE is of the opinion that they cannot directly add environmental criteria to the energy label, unless a mandate is given by the Government to do so. Overall, BEE is willing to support MoEFCC and BIS to propagate it.

Industry, Experts and other stakeholders: Discussions and deliberations at the stakeholder meetings indicate that interest and participation among industry groups and product manufacturers were varied. Many manufacturers, retailers and suppliers would potentially agree to ecolabeling for one or more of the following reasons:

1. To adhere to corporate social responsibility policy
2. To increase customer interest/satisfaction
3. To improve brand image
4. To cater to demand for environmentally-friendly products among select customers
5. To better compete with other retailers
6. To increase sales
7. To improve supply-chain management

Expected Impact on Cooling Appliances

Cooling appliances in India will be positively impacted by adhering to the requirements of the proposed ecolabeling program. Cooling appliances in India are also closely related to the citizens' daily life, and the ecolabeling program will enable consumers' involvement in environmental protection activities. For effective institution of an ecolabeling program for cooling appliances in India, it is essential to harmonize existing environmental regulations so as to eliminate multiple layers of approvals and documentation, and to encourage uptake. The proposed ecolabeling program should also link with ISO 14000. As ISO environmental management procedures are increasingly being given importance by Indian companies and manufacturing facilities, the proposed program will be well-received. Ecolabeling of cooling appliances in India will also considerably improve international sales of these products, as evidenced by the institution of ecolabeling programs in other countries.

The proposed ecolabeling criteria could follow the frameworks of the Japanese Eco-Mark, German Blue Angel, Taiwanese Green Mark, Canadian Environmental Choice Program, and the US Green Seal, and should align with India's ODS phase out schemes for all certified products. Several Indian manufacturers already produce such cooling products, and with the added certification, could be exported to a greater number of countries than the current scenario.

Expected Impact on Trade

The proposed ecolabel for cooling appliances in India is expected to be credible, transparent, and accessible by stakeholder groups – including, but not limited to governmental agencies, businesses/industries, academia, NGOs, and consumers.

The challenge is to strike a fine balance between achieving effective trade and a corresponding allocation of resources, propelling development to reduce poverty and raise resources for sustainability, and environmental protection for long-term preservation of natural resources.

Environmental regulations and programs, such as the proposed ecolabeling criteria for cooling appliances, should aim to:

- Gradually introduce and set international standards as the norm to be followed by local products circulated both externally and internally;
- Create policies and regulations that enable manufacturers to maintain price competitiveness;
- Ensure harmonization with international environmental laws and standards.

Maximizing the Impact of the Proposed Ecolabel

The goals of the proposed ecolabeling criteria are to:

- Improve with respect to India's international competitive position, by the creation of specific markets for sustainable cooling;
- Improve the overall quality image of India's cooling appliances; and
- Improve the environmental performance of existing cooling appliance models.

Thus, the proposed ecolabeling criteria will serve as an effective response to India's environmental concerns. The program will also be considered as an effort to boost the country's trade prospects with its progressive, western counterparts.

The proposed criteria will entail multiple layers of environmental compliance, and will attempt at formulating a set of criteria for all cooling appliance manufacturers. The higher levels of environmental compliance will compete with internationally acclaimed ecolabels for cooling devices, such as the EU Ecolabel.

Products that are able to adhere to the higher compliance levels will receive international recognition, and will consequently improve India's standing in the global cooling market.

The ecolabeling criteria will also align itself with the goals of India's National Cooling Action Plan, which aims at a market transformation to include more sustainable cooling equipment.

Uptake of the Proposed Ecolabeling Criteria

Owing to India's increasing focus on energy efficiency and environmental conservation, the proposed ecolabel has the potential to become a market standard, and be widely accepted by consumer groups. The criteria of the ecolabeling program could become the product norm, and future appliances manufactured could be compelled to adhere to them.

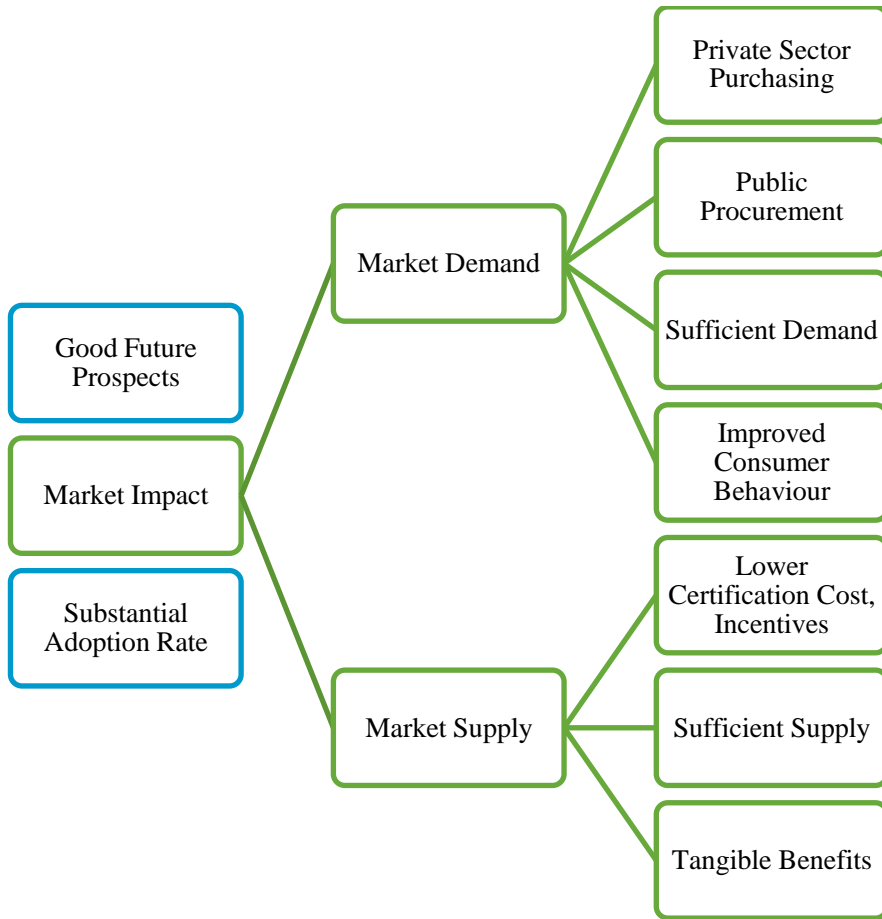
Considering the demand side of the market equation, India currently possesses significant demand for cooling products, and consumers are increasingly interested in purchasing sustainable cooling appliances. Consumer choice is also heavily dependent on the price premium that will have to be paid for eco-labeled products. The proposed program will, however, rely significantly on the moral persuasion of the consumers.¹⁷

Apart from consumer preferences, certain other key factors could also impact demand for ecolabeled cooling appliances. Consumer awareness of prevailing environmental problems, and the existence of the proposed ecolabel, as well as the credibility of the program, will greatly influence the uptake of the program.

The proposed ecolabeling criteria for cooling appliances are expected to have a significant market impact on the Indian cooling market, as illustrated below. Sufficient demand and supply will drive institutionalization of the program, while other factors, such as heavy purchasing by the private sector, consumer behavioral changes, and a greater availability of financial incentives to certifying parties will drive cooling market transformation.

¹⁷ "Eco-labelling: to be or not to be?"; Marisa Korteland; CU Delft

Figure 7: Market Impact of Proposed Ecolabel



04 Ecolabeling Approach for Cooling Appliances

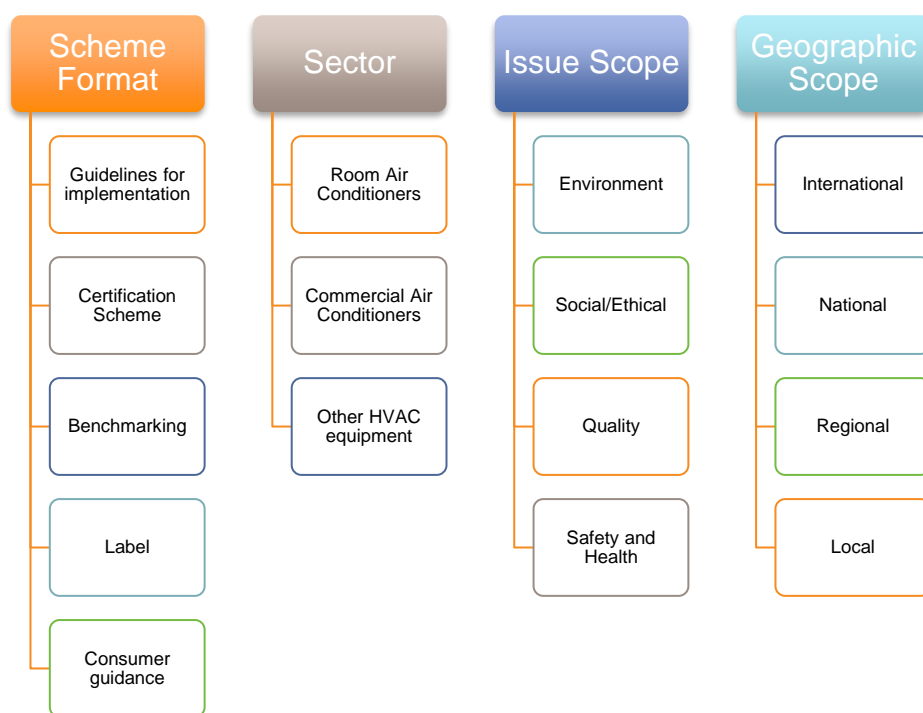
Room air conditioning units with cooling capacity up to 7 kW make up more than 80% of sales in India¹⁸. Experiencing a growth of 10-15% annually, AC demand is projected to grow around 8 times by 2037-38 as compared to the 2017-18 baseline¹⁹. Additionally, based on the anticipated demand for cooling equipment in the country, the cooperation of the entire cooling industry in the uptake of the ecolabeling program will be valuable, following which, demand for these products will continually show an upward trend.

A market transition to energy efficient and environment friendly air conditioners will not only accrue environmental benefits, but also reduce consumer electricity costs, increase energy security, expand the manufacturing sector, and create green jobs. Ecolabeling for air conditioners can be seen as a key to this transition strategy.

The approach to developing an ecolabeling program for air conditioners will be aligned with the broader framework of an ecolabeling program/revised *Ecomark* scheme. Some of the key parameters for ecolabeling will include²⁰ the guidelines for implementation (code of conduct), inclusion within relevant certification schemes/policy frameworks, relevant benchmarks for performance evaluation. The main steps for ecolabeling will include:

1. Identifying categories of environmental impact to be factored in the labeling program;
2. Quantifying environmental performance through life cycle assessment; and
3. Establishing the maximum thresholds for each criteria for each product category

Figure 8: Ecolabeling Framework for Cooling Appliances



Ecolabeling Criteria

Based on reviews of international environmental regulations and ecolabels, a set of potential criteria have been identified. Some of these criteria can be mandatory for product, and the rest, voluntary, to be pursued at the discretion of the certifying party.

1. Management, Operations & Maintenance
 - i. Environmental Management System
 - ii. Human Resource Management
 - iii. Sustainable Operations & Maintenance
 - iv. Communication, Social Education, and Outreach
 - v. Facility Resource Monitoring

¹⁸ India Cooling Action Plan, March 2019

¹⁹ Ibid.

²⁰ Feasibility Report on options for an EU ecolabel scheme for fishery and aquaculture products; February 2016

2. Sustainable Manufacturing
 - i. Use of Sustainable Materials (low toxicity, recycled and recyclable etc)
 - ii. Improvement of Process Efficiency
 - iii. Manufacturing Resource Use Monitoring
 - iv. Cost Effectiveness Analysis
 - v. Reduction of Human Toxicity
 - vi. Rainwater and greywater recycling
 - vii. Renewable Energy Incorporation – Facility Level
 - viii. Incorporation of Enabling Technologies
3. Sustainable Distribution, Consumption, and Disposal
 - i. Energy Efficiency
 - ii. Environment friendly (zero ODS and low GWP) Refrigerants
 - iii. Water Consumption Reduction
 - iv. Waste Prevention
 - v. Sustainable Disposal
 - vi. Promotion of Environmentally-Friendly Transport Options
 - vii. Renewable Energy Incorporation
 - viii. Innovative Waste Disposal Technologies
 - ix. Additional Environmental and Social Activities

The scope of ecolabeling requirements can be expanded beyond environmental footprint – to include social equity, quality and durability of products, and human health and safety.

Implementation approach for Ecolabeling

The key aspects to successful uptake of ecolabeling program are:

Government Support and Uptake

Global experience shows that private ecolabeling programs have often had limited success in niche markets, and are restricted to smaller manufacturing facilities and companies interested in increasing market share. On the other hand, government-run programs (for example, the US EPA's Energy Star program) have enjoyed a close to 100% market penetration, owing to the fact that several of the program provisions were mandated by law. European ecolabeling programs that have been administered by governmental agencies have also enjoyed high success rates.

In India, MoEFCC or its agencies will be the primary governmental organization to be involved in drafting specific criteria for the proposed ecolabeling program, and the Bureau of Indian Standards will be the primary implementing organization. Other ministries, such as the Ministry of Chemicals and Fertilizers, Ministry of Commerce and Industry, Ministry of Power, Ministry of New and Renewable Energy, among others, are expected to play an integral role in the drafting and sustenance of the program.

Adequate funding for program development, compliance, and outreach

The ecolabeling program design, initial development, infrastructure for testing and compliance and consumer outreach require long term and steady financial support. Implementation and certification costs can potentially be supported through revenue generated as the ecolabeling program matures, and has a larger uptake.

Stakeholder Engagement

Stakeholder involvement is crucial for a successful ecolabeling program. These include government agencies, manufacturers, industry professionals, retailers, industry associations, and consumers. The program approach, design, performance objectives, challenges, and applicable benefits need to be discussed through multiple consultations with each group.

Consumer Outreach

Increase consumer awareness and recognition for ecolabeled products for influencing consumer purchasing behaviors.

Consumer and Industry Incentives

Incentives for manufacturers, such as tax breaks, awards, or free recognition and publicity; consumer incentives such as tax rebates, prizes, or price stability will greatly expand participation in the proposed ecolabeling program.

Improving program clarity

The integration of the mandates of the proposed ecolabeling program with existing programs and policies will eliminate multiple layers of regulation, and will encourage greater participation. Additionally, improving the design of the label, and including endorsement from government agencies will aid consumer understanding of the environmental performance of the products.

05 Recommendations and Conclusion

Ecolabeling criteria for cooling appliances in India is intended to provide information to consumers about the environmental footprint of different products, and enable them to make sustainable choices. This program will serve to provide incentives to reward manufacturers and retailers that adopt the required environmental criteria, and will drive innovation and improvements in cooling appliance production. Furthermore, it will develop new markets and increase market access to select products meeting ecolabeling criteria.

Supportive mechanisms and policy frameworks should be put into place to overcome or mitigate the effect of these barriers, as detailed below.

1. Creation of supportive policy and regulatory environments, which also include environmental performance targets;
2. Creating a greater role for industry trade associations to encourage the sharing of information and data, and minimize the lack of awareness of newer, cutting-edge environmental technologies;
3. Creating and managing a team of environmental specialists or analysts to monitor and evaluate industrial/manufacturing performance systems;
4. Conducting training programs and capacity building activities for industry staff and managers to build technical capacity;
5. Exploring financing options for the incorporation of state-of-the-art equipment within facilities; and
6. Adequate marketing to increase exposure to ecolabeled products, and consequently increase demand for these products; and
7. Governmental agencies, such as the MOEFCC and BIS, should initiate pilot projects on a select group of cooling products to demonstrate the value of life cycle management to the entire pool of Indian appliance manufacturers. Additionally, these agencies must also make available the required tools, trainings, and data for life cycle management, and this strategy should be integrated into governmental processes.

Review Establishes Need for Cooling Appliance Ecolabeling in India

An analysis of the present scenario suggests that there are several global ecolabels that cater specifically to cooling devices and equipment – including, but not limited to, BASF Eco-Efficiency, Blue Angel, Japan Energy Saving Labeling Program, ENERGY STAR, EU Energy Label, and Korean Ecolabel. However, none of these currently operate on a large-scale in India. The proposed ecolabeling criteria in India could be modeled on similar lines.

- Most of these ecolabels adopt a holistic approach to environmental performance assessment and include several environmental/ecological impact categories/parameters, such as energy use, climate change/global warming potential, carbon footprint, resource/fossil fuel consumption, quality, and toxicity;
- Several of these labels adopt a life cycle impact analysis methodology when awarding certifications, and focus on conducting a typical inventory analysis to conduct accurate calculations;
- Considering the exponential rise in usage of cooling devices among the residential and commercial sectors in India, the institution of an ecolabel for cooling devices in the country is imminent. Several ecolabels have already been instituted in countries such as the US, UK, Japan, and Korea, to emphasize on energy efficiency within cooling appliances. The proposed labeling program could be modeled based on these international ecolabels;
- It is feasible to introduce an Ecolabeling program for cooling devices in India. To successfully design and implement such a program, it is essential to institute a framework that will attract manufacturers, and facilitate ease of certification;
- Strategies for communication and public dissemination of the proposed ecolabel will have to be mapped out; and
- The Ecolabeling framework will have to be designed in a way to potentially include other sectors and product types in the future.

The characteristics of the proposed ecolabeling criteria will include the following:

- The proposed criteria will be partly voluntary, will intend to promote products with reduced environmental impact throughout their entire lifecycle, and will provide consumers with accurate, transparent, and scientifically-proven information on the environmental impact of products;
- Future amendments to the proposed ecolabeling criteria will be possible after gathering appropriate experience in administering the label;

-
- Amendments will be incorporated in compliance with the provisions of the administering organization of the proposed ecolabel;
 - The proposed ecolabeling criteria will be based on the highest environmental standards and regulations currently operational in India, with the aim of achieving the best environmental performance for all products bearing the proposed ecolabel;
 - The ecolabeling criteria will aim at reducing human toxicity due to hazardous substances;
 - It is expected that environmental NGOs and consumer organizations will play an important role in the widespread uptake and marketing of the proposed ecolabeling criteria;
 - The general public will be informed of the ecolabeling criteria and its policies through marketing campaigns and awareness programs;
 - The ecolabeling criteria will inform consumers and industry associations of the environmental characteristics of all products covered by the program;
 - Priority will be given to alternative, innovative compliance methodologies and technologies, as well as self-regulation. Self-regulation methods will be assessed by openness of participation, added value, quantifiable goals, representativeness, involvement of civil society, monitoring and reporting, and cost-effectiveness²¹; and
 - The scope of the proposed ecolabeling criteria is subject to expansion to other product categories.

Instituting ecolabeling criteria specifically for cooling devices, within India's *Ecomark*, is expected to achieve the following benefits:

- Consumer engagement and orientation toward high-performing, eco-friendly products;
- Link with the Refrigerant Phase-out Initiative (managed by the MoEFCC);
- Link with the proposed National Cooling Action Plan for India;
- Build on the building codes and rating program's Environmental Product Declaration credit;
- Revival of the *Ecomark* program, and widen its scope to include household appliances and equipment; and
- Incorporate any secondary effects on energy and the environment while assessing the environmental performance of a product.

²¹ Directive 2009/125/EC of the European Parliament and of the Council; October 2009

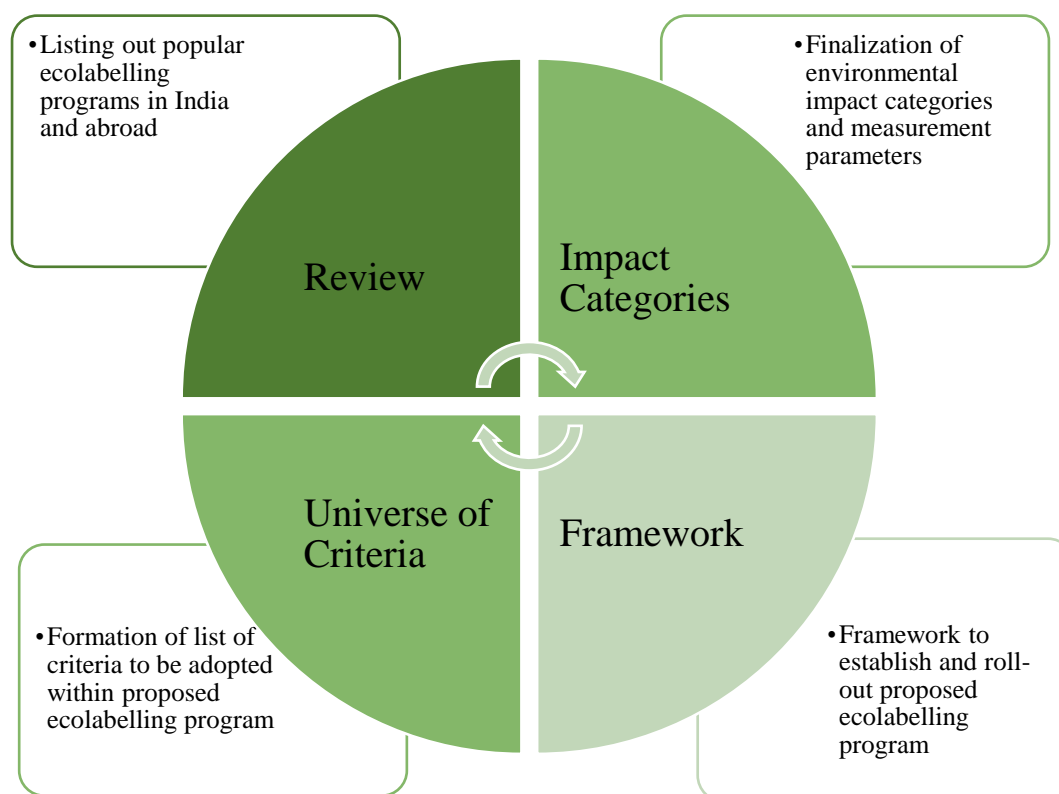
Appendix A: Study - Approach and Methodology

Scope

The study involves a feasibility study for the introduction of an ecolabeling program for cooling appliances in India, its key features, and methodology for development of a framework for implementation. This study includes the following:

1. A thorough and comprehensive assessment of existing labeling program in India and internationally including existence of any Act, rules and regulations, and compare the measurement methodologies of each.
2. A detailed literature review of reference documents which includes existing standards and regulations, academic studies on the environmental impacts of refrigeration and air conditioning devices etc. Formulate strategies to reduce the impact of these stages on the environment and the climate.
3. A framework for integration of proposed ecolabeling criteria for cooling appliances into the existing *Ecomark* program.
4. A feasibility of the integration of various existing metrics, such as the Life Cycle Climate Performance (LCCP) index, within the proposed label; the possibility of the integration of these mandates within existing policy frameworks.

Figure 9: Approach and Methodology



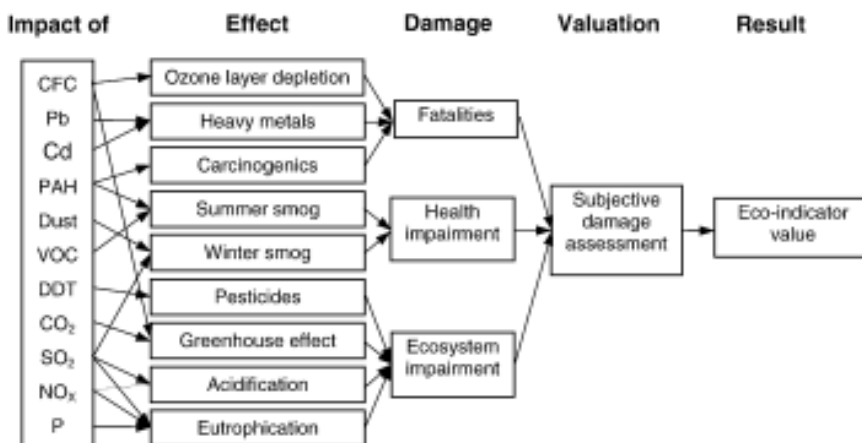
Environmental Impact Measurement Methodology

This study will identify environmental categories impacted by cooling devices and measure their impact within each lifecycle stage. The proposed ecolabeling criteria are expected to be modeled on the ISO 14040 series of standards, which lays down the following methodology to be followed:

- **Air Pollution:** The environmental impact in this category will be measured by measuring the quantity of contaminants released by the product.
- **Water Pollution:** The environmental impact of the product in this category will be measured by quantifying the amount of water used and changes in water quality based on several quality indices (such as total suspended solids, pH value, alkalinity, and biological oxygen demand). This assessment will follow ISO 14044 and ISO 14046.

- **Energy Consumption:** Energy consumption and efficiency will be measured as per the respective Indian or international standard.
- **Global Warming Potential:** This will measure the heat trapping capacity of the product and will be represented in carbon dioxide emitted, in kg or tonnes CO₂ equivalent.
- **Acidification:** This phenomenon is caused by significant increase of CO₂ in the atmosphere, which results in an increase in oceanic CO₂. This in turn leads to a decrease of the average pH value of the ocean surface. This phenomenon could be kept in check by monitoring a product's CO₂ expulsion, and by conducting alkalinity tests on discharges released into water bodies.
- **Ozone Layer Depletion:** A product's impact on this category can be measured and mitigated by prohibiting or phasing out the use of HCFCs and other ozone depleting chemicals, such as halons and synthetic halocarbons.

Figure 10: Sample Eco-indicator diagram



Since the focus of the proposed ecolabeling criteria is cooling devices, an effort will be made to assess the footprints of the HFC and HCFC refrigerants, as well as that of the relatively newer and more eco-friendly refrigerants, such as HFC410A. The study will emphasize on strategies to reduce global warming and ozone depletion potentials, as well as the discharge of industrial wastes. The program will be designed in such a way as to require appropriate clearances confirming compliance with the mandates of the Water (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Cess Act, Air (Pollution and Control of Pollution) Act, and Noise Pollution (Control and Regulation) Rules.

The study also lists out the several environmental impact categories that could be incorporated into the proposed program. It advocates the use of an "Eco-indicator" diagram to calculate environmental performance of a product. The specific environmental impact categories have been described in detail in later sections.

Appendix B: Existing Global Ecolabeling Labels and Standards

A comprehensive review of three major Ecolabeling programs around the world – the EU Ecolabel, Green Seal, and Good Environmental Choice Australia – sheds light on the successes and failures of each program, and generates a series of recommendations to facilitate the incorporation of an Ecolabeling program in India. An abbreviated list of International ecolabels for cooling devices is provided below.

Table 3 A Few Existing Global and National Ecolabels

LABEL	REGION(S)	PRODUCT TYPES COVERED
BASF ECO-EFFICIENCY	Brazil, Germany, USA	Cooling devices, building products, cleaning products, cosmetics, electronics, energy, forest products, healthcare, machinery
B-CORPORATION	USA, Canada	Cooling devices, building products, carbon offsets, food, financial services, textiles, tourism, water, waste, electronics, energy
THAI GREEN LABEL	Thailand	Cooling devices, building products, cosmetics, electronics, paper, textiles, transportation, water
BLUE ANGEL	Australia, Belgium, France, Germany, Greece, Italy, NZ, Poland, Norway, Spain, Sweden, UK, USA, South Africa	Cooling devices, building products, electronics, paper, machinery, packaging, transportation, waste
CRADLE TO CRADLE CERTIFIED PRODUCTS PROGRAM	USA, France, Germany, Spain	Cooling devices, building products, cleaning products, cosmetics, electronics, furniture, machinery, textiles, forest products
ECOMARK: INDIA	India	Building products, electrical household appliances, cleaning products, cosmetics, food, forest products, packaging, textiles
ENERGUIDE FOR APPLIANCES	Canada	Cooling devices, other household appliances
ENERGY STAR	USA, New Zealand, Canada	Cooling devices, building products, household appliances, electronics, machinery
ENVIRONMENTAL PRODUCT DECLARATION	Belgium, Italy, UK, Switzerland, Taiwan	Cooling devices, building products, cleaning products, commodities, energy, electronics, machinery, textiles, transportation, water
EU ECOLABEL	Europe, Australia, Canada, Malaysia	Cooling devices, household appliances, building products, cleaning products, electronics, forest products, textiles, tourism
CHINA ENVIRONMENTAL LABELLING	China, New Zealand	Cooling devices, household appliances, building products, cleaning products, electronics, forest products, packaging, textiles, transportation
JAPANESE ECOMARK	Japan	Cooling devices, other household appliances, building products, cleaning products, electronics, textiles

NORDIC SWAN	Denmark, Finland, Iceland, Norway, South Africa	Cooling devices, other household appliances, building products, cleaning products, cosmetics, forest products, machinery, tourism, food
KOREAN ECOLABEL	South Korea	Cooling devices, other household appliances, building products, furniture
AUSTRIAN ECOLABEL	Austria	Cooling devices, tourism, forest products, paper

Some of the key labels have been studied in detail and are mentioned in the following pages.

The EU Ecolabel

BACKGROUND TO THE LABEL

- Instituted in 1992 and has been in operation for several years; has seen several significant changes and modifications to its environmental performance mandates.
- The European Commission currently manages the roll-out and implementation of this label, and the program is part of an overarching EU Action Plan on Sustainable Consumption and Production and Sustainable Industrial Policy.⁹
- This labeling program covers a wide variety of products and product types, and includes a comprehensive range of environmental performance assessment criteria. It includes personal care products, cleaning products, textiles, paints, electronic equipment, coverings, furniture, garden equipment, household appliances, lubricants, paper products, and ecotourism. Certain substances, such as UV varnishes and UV inks, are exempt from the requirements of this labeling program.
- It is a voluntary program that promotes environmental excellence among manufacturers, and provides a means of reducing environmental impact to consumers.
- Most prevalent in France, Italy, and Germany.
- Environmental criteria include recyclability, water emissions, air emissions, waste generation, and energy consumption.
- The total number of licenses awarded under this program has increased from 95 in 2001 to 1671 in 2012, and the number of companies registered under this program has increased from 83 in 2001 to approximately 1000 in 2012.



BENEFITS OF THE LABEL

- The direct benefits of using an EU Ecolabeled product include conservation of electricity and water, reduced pollution, materials savings, and reduced hazardous substance use.
- The indirect benefits of using this label include the establishment of a robust framework for future ecolabels, increased stakeholder awareness, and potential for the establishment of fiscal measures to promote green products.

SCOPE FOR TECHNICAL AND IMPLEMENTATION IMPROVEMENT

- There currently exist discrepancies in performance measurement mechanisms of the products certified under this label.
- There is a dire need to modify existing environmental performance parameters to become more competitive.
- The other drawback of the program is that it includes a non-feasible set of environmental performance criteria that makes it difficult for several products and product types to meet those criteria.
- Furthermore, the program does not offer sufficient financial incentives to adhere to the mandates of this program, and there exists a current non-realization of the complete potential of the program.

Barriers to EU Ecolabel Implementation, Implemented Solutions

A joint study conducted by the European Environmental Bureau (EEB), The European Consumer Organization (BEUC), and Association for the Coordination of Consumer Representation in Standardization (ANEC), identified loopholes in the implementation of the EU Ecolabel, and suggested roundabout strategies for the same. A summary of this study has been provided below:

Table 4 EU Ecolabel Roadblocks and Solutions

PROBLEM	SOLUTION
Initial cost of adopting the ecolabel	Improve sales, develop effective marketing strategies, bolster demand for eco-friendly products
Too much documentation and red-tape, documentation too complex	Simplify paperwork by integrating documentation requirements with those required by existing industrial standards
Lack of recognition by stakeholders and public institutions, difficulty of communication to stakeholders and consumers	Improve communication to stakeholders through effective claims that correspond to societal expectations
Requirements do not address the most relevant environmental impacts	Put into place a periodic review mechanism to keep up with technological advances

In the institution of an ecolabel for India, an attempt should be made to craft a realistic set of environmental assessment criteria for different types of air conditioners, as well as for other energy-consuming cooling equipment. A life cycle systems boundary must be set for each, and the scope of environmental performance monitoring must be clearly defined. Furthermore, the introduction of financial incentives must be explored to encourage more participation in the Ecolabeling scheme.

EU's Approach to Labeling of Cooling Appliances

The EU places a considerable focus on the development of Ecolabeling and environmental criteria for cooling devices. Several energy-efficiency-focused ecolabels operate in the EU: the EU Ecolabel, the German Blue Angel, the Nordic Swan, the Austrian Ecolabel, ENERGY STAR, and the Japanese Ecomark. Error! Bookmark not defined. To assist in the ease of uptake of one or more of these labeling schemes, the Union has also introduced several EU Directives (such as the Energy Performance of Buildings Directive and Cogeneration Directive) were also introduced; these promote and provide incentives for increased energy efficiency and clean energy incorporation.

All of these ecolabels, when developing Ecolabeling criteria, conduct a feasibility and market study to assess market structure and demand, key environmental impacts, and key elements relating to a product's fitness for use, and an inventory analysis of ecolabels, standards, testing methodologies, and roll-out mechanisms. With respect to cooling systems, all systems are first classified into two primary categories Error! Bookmark not defined.:

- **Central cooling systems:** Systems that are designed to provide cooling to the whole building, or a major chunk of a building. These systems typically incorporate distribution systems
- **Space cooling systems:** Systems that provide cooling to one or few rooms. These systems do not incorporate distribution systems.

Several additional types of cooling equipment (circulators, central AC units, room ACs, local mechanical ventilation) are then listed out.

The second step to the development of criteria is to assess the types of fuels and energy sources used within these systems. Global Warming Potential (GWP) is a key impact category in the development and successful roll-out of Ecolabeling schemes for cooling devices in the EU. The several types of energy sources currently used include the following: natural gas, liquid fuel, liquid biofuel, electricity, solid fuel, and solid biomass fuel. Error! Bookmark not defined.

The two steps involved in cooling a particular portion of a building are then taken into consideration Error! Bookmark not defined.:

- The generation of cooling
- The distribution of cooling, using motors, pumps, and circulators, etc., or by forced-air, water circulation through pipes, or steam fed through pipes.

A review of existing mandatory and voluntary legislation is carried out to identify environmental criteria. The EU contains the following regulations^{Error! Bookmark not defined.}:

- Energy Label (in addition to the several ecolabels specified above)
- Several policy instruments, such as Ecodesign, Boiler Directive, Renewable Energy (RES) Directive, Cogeneration Directive, and Energy Performance of Buildings Directive.

In drafting environmental criteria, the approximate usage patterns of different cooling equipment are analyzed and divided into the following categories.^{Error! Bookmark not defined.}

- High primary energy consumption (with significant emissions) – equipment typically employed within industrial facilities
- Long operating times (up to 24 hours a day)
- Intermittent usage (up to 8 hours a day)

The uptake of these types of equipment with the three key types of sectors (domestic, tertiary, and industrial) are also taken into account when making this distinction.

The ecolabels operating in the EU consider the following environmental impact categories when conducting an impact assessment.^{Error! Bookmark not defined.}

- Recyclability
- Global Warming Potential
- Life of Product
- Reparability
- Pollution
- Energy Consumption

Some labels also take into account third-country specifications (such as Minimum Energy Performance Standards – Japan, and ENERGY STAR – United States), when developing criteria. The life cycle stages typically considered, and the measurement parameters usually adopted, are given below.^{Error! Bookmark not defined.}

Table 5: Life Cycle Stages and Measurement Parameters

Manufacturing	Pollution, resource consumption, safety, human toxicity
Consumer Use	Optimum performance, sustainable usage behaviors, usage of sustainable fuels, sustainable O&M
End-of-Life	Sustainable disposal, recyclability

In facilitating the successful roll-out of an Ecolabeling scheme, local and state governments are encouraged to impose certain minimum energy efficiency and environmental standards, to bolster market uptake of sustainable cooling devices.

Furthermore, most of these ecolabels incorporate improvement mechanisms, and their mandates are periodically reviewed to add in additional criteria to keep up with technological progress and innovation.

Green Seal Labeling Program

BACKGROUND TO THE LABEL

Green Seal was implemented in 1989, and includes a number of credible environmental standards that help consumers, industrial associations, and manufacturers make sound, environmentally-friendly choices. This Ecolabeling program currently operates in Canada, USA, South Korea, Puerto Rico, South Africa, and Indonesia.

This Ecolabeling program awards certification based on assessments by verified third party organizations, and adopts a life-cycle approach to measuring sustainability. The standards cover household products, construction materials, paints and coatings, printing and writing paper, foods, cleaning products, cleaning services, personal care products, and ecotourism.

This ecolabel measures the environmental impact of a product within the following categories:

- Human and environmental toxicity
- Use of hazardous chemicals
- Impact of packaging
- Transportation impact
- Disposal and end-of-life impact
- Resource consumption
- Operating efficiency
- Manufacturing impact

The performance assessment methodology adopted by this program complies with the ISO 14040 series of standards. Certifying products are required to comply with a rigorous set of environmental criteria, and adhere to a periodic monitoring process and demonstrate continuous improvement.²¹

The labeling program follows the requirements set down by the U.S. Environmental Protection Agency to implement transparency in third-party certification^{Error! Bookmark not defined.}:

- Life-cycle, multi-attribute approach
- Open, transparent consumer communication
- Regular improvements to existing standards and requirements
- Facility inspections, third-party audits
- Implementation of protocols for testing labs
- Easy access to certification, no restrictions on company/manufacturing facility size

BENEFITS OF THE LABEL

Several studies on the environmental benefits of the Green Seal have shown that products certified under this program emit significantly lower GHG emissions, increase uptake of “green” products among consumers, and reap long-term financial benefits. The other benefits accrued by manufacturers certifying under this program include²¹:

- Improvement in human health and well-being
- Improvement in product quality
- Expanded customer base, entry into high-value niche markets
- Increased customer loyalty
- Improved community relations
- Increased profitability, brand enhancement



LESSONS FOR INDIA'S ECOMARK

The proposed ecolabel in India could potentially look at certifying different types of cooling appliances - a separate set of environmental performance criteria could be set for different types of cooling devices, based on estimated usage patterns. The development methodology adopted by Green Seal could be incorporated in developing a similar set of Ecolabeling criteria for cooling devices in India:

Select the types of cooling devices, identify refrigerants used

Conduct a market survey – establish the requirement for an Ecolabeling program, explore methods to bolster demand

- Select the environmental criteria applicable to each equipment type
- Define the scope of assessment for each environmental impact category
- Outline the resources available to achieve effective outreach and institution of the Ecolabeling program
- Implementation and continued improvement to program requirements and mandates

Additionally, several other operational aspects of the Green Seal program can be adopted for the proposed Ecolabeling program in India. For example, Green Seal offers marketing services to interested manufacturers: it assists in the development of a consumer outreach plan and sales strategies, aids in the certification of newer product types, and provides advice on sustainable packaging techniques. **Error! Bookmark not defined.** Furthermore, a separate standard to measure environmental innovation was recently introduced under the Green Seal umbrella – a move that could be successfully instituted in the Indian context.

Encouraging Environmental Innovation – the Green Seal Model²²

The primary motivation behind the launching of a separate standard for innovation is the belief that environmentally innovative strategies and approaches, and newer cutting-edge technologies, are critical to overall sustainability of a region's economy.

This standard was specifically instituted to address and certify products that do not fall under any of the conventional certification realms. All products, services, and technologies that demonstrate a significant environmental benefit are eligible for certification under this standard. Keeping in line with the other standards under Green Seal, all new initiatives are evaluated for the following:

- Functional Performance
- Protection of Human Health and Environment
- Innovation – demonstrating that performance is equivalent or significantly better than other similar products

The result of this certification is that the concerned manufacturer can earn recognition as an industry leader, build a brand for the innovative product or service, and consequently increase customer base.

Good Environmental Choice Australia (GECA) program

BACKGROUND TO THE LABEL

- Good Environmental Choice Australia (GECA) was introduced in 2000, also adopts a life-cycle approach, and encompasses a comprehensive list of individual standards for adhesives, household furnishings, cement and concrete products, cleaning products and services, furniture and floorings, lighting, household appliances, plastics, paper products, building insulation, and heating and cooling systems.²³
- This standard strongly emphasizes the use of sustainable refrigerants for heating and cooling systems, and currently covers the following types of air conditioning systems.
 - Domestic Air Conditioning Systems
 - Industrial Air Conditioning Systems
 - Vehicle Air Conditioning Systems



²² GS-20 – the Green Seal Standard for Environmental Innovation

²³ Official website of Good Environmental Choice Australia

- The primary criterion for the evaluation of the environmental friendliness of refrigerants is their global warming potential. All refrigerants certified under this program are required to have a global warming potential of 10 or less, as measured as CO₂ equivalent over a period of 100 years.
- The certifying products are also required to undergo a rigorous testing and screening process, which involves the supplying of a declaration from the producer/supplier of refrigerants that the GWP potential has been complied with. Additionally, the program prohibits the use of CFC, HCFC, and other ozone-depleting compounds within refrigerants utilized in these cooling systems.

Manufacturers of cooling equipment that are interested in certifying under GECA must first demonstrate compliance with AS 1677 (Refrigerating Systems).

Relevant Criteria That Could Be Adopted Within the Indian Scenario

The GECA labeling program includes environmental, health, and ethical criteria to be met.

Environmental Criteria

- Ozone depletion potential must be zero
- Global warming potential must be less than 10
- Packaging must be easy to recycle, or should be subject to a take-back arrangement with the manufacturer

Health Criteria

- Packaging must not contain chlorinated or halogenated products

Ethical Criteria

- Demonstrate workplace safety, fair pay, equal opportunity
- Suitable information must be supplied to the public (such as Safety Data Sheets)
- All environmental claims must be independently verified
- Lawful conduct and environmental compliance must be enforced

A number of documents, including, but not limited to, permits, signed declarations, pay slips, documentation of compliance with ISO 14021, all product advertising material, are required to be submitted for verification before final certification.

Manufacturers dealing specifically with cooling equipment experience the following benefits post-certification with GECA:

- Mitigation of the ozone depletion phenomenon
- Easy-to-dispose of packaging
- Zero use of hazardous substances in packaging – improved human health and well-being
- Mitigation of global warming
- Ease of compliance with local and international environmental regulations

For India, the establishment of a standard to measure refrigerants' sustainability will have to take into consideration the global warming potential of the product(s) under question, as well as human toxicity, affordability, and resource consumption.

Korea Ecolabel

BACKGROUND TO THE LABEL

The Korean Ecolabeling system was launched in 1992, and is an advanced environmental labeling program that covers approximately 161 categories of products, including, but not limited to, paper, photocopy machines, printers, paints, and cooling devices.



It is administered by the Korean Ministry of Environment's Environmental Technology and Economy Division, and the Korea Environmental Industry and Technology Institute (KEITI).²⁴

This label can be classified as a Type 1 ecolabel, and follows the ISO 14024 framework. It facilitates the provision of reliable information on eco-friendly products to consumers, and directions to companies to develop/manufacture and sustain eco-friendly products.

The Korean Ecolabeling program covers the following product categories:

- Industrial Goods and Machinery
- Vehicles, Leisure, and Culture
- Home Appliances and Furniture (includes cooling devices)
- Office Equipment and Furniture
- House-Building Materials and Machinery
- Houseware and Personal Care Products
- Mixed-Use Products

The primary environmental criteria measured when awarding this label are environmental pollution and resource consumption.

Testing and certification procedure is carried out by the KEITI Environmental Analysis Center, and follows international standards of compliance (ISO/IEC 17025).¹⁷

SUCCESS FACTORS OF THE LABEL

- KEITI elevates the brand image of certified products by offering special recognition and registration with governmental agencies. KEITI offers promotional services to certified products and manufacturers
- There are mandates in place to facilitate obligatory purchase of certified products by public institutions.

The other success factors of this label include the following. Error! Bookmark not defined.

- Mandatory governmental provisions to bolster the growth of a market for eco-friendly products
- Establishment of a monitoring, evaluation, and learning system for periodic upgradation of labeling clauses and ensuring sustained compliance with these clauses

LIMITATIONS AND SCOPE FOR IMPROVEMENT FOR THE LABEL

- Ineffective management of administration of label
- Incomprehensive criteria for certain products and services (for example, construction materials)

The Korean Energy Efficiency Standards and Labeling Program

The Korean Energy Efficiency Standards and Labeling Program is a subsidiary of the larger Korean Ecolabeling Program, and was instituted with four primary goals in mind²⁵:

- Reducing dependence on fossil fuels
- Bolstering investment in energy efficiency
- Mitigate natural disasters caused by climate change
- Create new jobs and job sectors

This label was also initiated in 1992, and targets products with high energy consumption. All products certified under this program are required to indicate their "*energy efficiency grade*", which quantifies their energy consumption and energy saving potential.

This label covers the following appliances: refrigerators, freezers, ACs, washing machines, dish washers, dish driers, hot and cold water dispensers, rice cookers, vacuum cleaners, electric fans, air cleaners, incandescent lamps, fluorescent lamps, lamp ballasts, 3 phase electric motors, domestic gas boilers, electric cooling and heating equipment, TVs, window sets, electric transformers, electric fan heaters, electric stoves, dehumidifiers, automobiles, and multi-split heat pumps Error! Bookmark not defined.

²⁴ "Korea Eco-Label Program and Green Supply Chain Related Activities" (Submitted by Japan); Dialogue on APEC Cooperation Network on Green Supply Chain, May 2015

²⁵ "Korea's Energy Standards and Labeling: Market Transformation"; Korean Ministry of Knowledge Economy and Korea Energy Management Corporation

The general formula used to calculate the efficiency index of a cooling product is presented below. Error! Bookmark not defined.

R (Energy Efficiency Level Index)

$$= \frac{\text{Maximum power consumption of a given model } \left(\frac{\text{kWh}}{\text{month}}\right)}{\text{Monthly power consumption of a given model } \left(\frac{\text{kWh}}{\text{month}}\right)}$$

Where

Maximum power consumption = The lower limit of the Minimum Energy Performance Standard (5th grade)

Monthly power consumption = Actual measured values obtained from KS C IEC 62552 measurement methodologies
Appliances are rated on a scale from 1st grade to 5th grade, with 1st grade products being capable of a 30-40% energy saving. To obtain certification, products are required to go through energy efficiency labeling tests conducted by third-party agencies and laboratories. The Korean Ministry of Knowledge Economy (MKE) drafts policy regulations and amendments on energy efficiency labeling, whereas the Korea Energy Management Corporation (KEMCO) implements the labeling scheme.

Appendix C: Summaries of Stakeholder Consultations

Meetings at the Bureau of Indian Standards

Two meetings were held at the Bureau of Indian Standards to discuss the feasibility of incorporating ecolabeling criteria for cooling devices in India.

SUMMARY OF DISCUSSION

1. India has voted in favour of the ISO 14067, which deals with carbon foot-printing of products. Additionally, ecolabeling criteria already exist for 18 product categories (which does not include cooling appliances).
2. Ecolabeling criteria for cooling devices and equipment can be added to the current list of *Ecomark* criteria. The feasibility of this step and future roll-out mechanisms have to be formulated.
3. The BIS welcomes the incorporation of life cycle assessment methodologies in drafting this set of ecolabeling criteria. Additionally, it also supports the development of a multi-criteria model for the proposed ecolabel (the label will measure pollution, human toxicity, global warming, waste management, and acidification, among others).
4. A meeting was previously convened by the MoEFCC to discuss the *Ecomark*, and the BIS was an integral part of the discussion.
5. For the proposed ecolabel, the MoEFCC could assist in creating the framework, and BIS will manage the roll-out and administration.
6. The key environmental impact categories to be focused on for cooling appliances and equipment are: global warming potential, human toxicity, emissions, and energy consumption. The uptake of the future label has to be discussed, market dissemination strategies must be adopted for accelerated roll-out, and cost-effectiveness must be ensured throughout the process.

Meeting at the Ministry of Environment, Forest, and Climate Change

A meeting was held at the Ministry of Environment, Forest, and Climate Change to discuss the feasibility of incorporating ecolabeling criteria for cooling devices in India, as well as into the National Cooling Action Plan for the country.

SUMMARY OF DISCUSSION

1. A PowerPoint on Ecolabeling was presented to Dr. Amit Love of the Ozone Cell, MOEFCC. Dr. Love was supportive of the concept and offered suggestions to take the implementation of such a program forward.
2. Ecolabeling criteria for cooling devices and equipment can be added to the current list of *Ecomark* criteria, as *Ecomark* currently does not cover cooling equipment.
3. Continuous engagement with manufacturers is essential to explore the feasibility of incorporating such a label in India.
4. A meeting was previously held with BIS to discuss the feasibility of the implementation of such a program, and the Bureau was supportive of the idea. However, the mandate of such a program has to be obtained from MOEFCC.
5. For the proposed ecolabel, the MoEFCC could assist in creating the framework, and BIS will manage the roll-out and administration.
6. The key environmental impact categories to be focused on for cooling appliances have to be decided upon holding future stakeholder consultation workshops. There is scope to integrate the requirements of such an ecolabel within the National Cooling Action Plan for India.

Meeting at UNDP

A meeting was held at UNEP to discuss the feasibility of incorporating ecolabeling criteria for cooling devices in India.

SUMMARY OF DISCUSSION

1. A discussion on the feasibility of the institution of an ecolabeling program for cooling appliances in India was held with Mr. Atul Bagai of UNEP. He is of the opinion that introducing such a program is feasible, and is also necessary to introduce transparency within the environmental compliance sector.
2. MOEFCC's prior experience with ecolabeling has not been up to the mark, and it is essential to study the roadblocks faced earlier and formulate a feasible ecolabeling implementation plan.
3. The proposed program could also incorporate climate change mitigation into its criteria.

4. A meeting was previously held with BIS to discuss the feasibility of the implementation of such a program, and the Bureau was supportive of the idea. However, the mandate of such a program has to be obtained from MOEFCC. Additionally, *Ecomark* has to be studied in detail to identify challenges to roll-out.
5. For maximum effectiveness, creating a voluntary program will aid the uptake; certain mandatory provisions could also be drafted. Top-rated products and manufacturers could be targeted for the initial roll-out. Approaching NITI Aayog could aid in the implementation.
6. The key environmental impact categories to be focused on for cooling appliances have to be decided upon holding future stakeholder consultation workshops. Disposal mechanisms should be a particular focus.
7. The effect of the proposed ecolabeling program on international trade has to be studied closely.

Meeting at MOEFCC

A meeting was held at MOEFCC to discuss the feasibility of incorporating ecolabeling criteria for cooling devices in India, and the possibility of integrating the proposed ecolabel within the mandate of the Ministry.

SUMMARY OF DISCUSSION

1. A discussion on the feasibility of the institution of an ecolabeling program for cooling appliances in India was held with Mr. Gyanesh Bharti of UNEP. He is of the opinion that introducing such a program is the need of the hour for India, and a specific focus on cooling is essential.
2. It is essential to study the roadblocks faced earlier and formulate a feasible ecolabeling implementation plan.
3. An introduction to CLASP and the Ecolabeling study was provided by Dr. Archana Walia to Mr. Bharti. She also stressed on the importance of going beyond energy efficiency and integrating other allied environmental measurement parameters within the proposed ecolabeling program. Potential technical support for the effective roll-out of the program is available through CLASP and its partners.
4. The proposed ecolabeling program will have to be included within the mandate of MOEFCC. Additionally, *Ecomark* has to be studied in detail to identify challenges to roll-out.
5. For maximum effectiveness, creating a voluntary program will aid the uptake; certain mandatory provisions could also be drafted. The proposed program should be amenable to include other product categories in the future.
6. The key environmental impact categories to be focused on for cooling appliances have to be decided upon holding future stakeholder consultation workshops.

Appendix D: Additional Information – Life Cycle Assessment (LCA) for Air Conditioners

Different sectors and products are energy and resource-intensive during varying life cycle stages. Based on this, all products and services can be broadly classified into five categories²⁶:

- **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 raw materials such as raw metals, natural extracts, bricks, and concrete.
- **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 ACs, and chemicals.
- **Distribution Intensive Product:** These products have the maximum impact when they are distributed to different retailers in several regions. Such products also involve heavy packaging, which adds to their environmental impact. Examples of these products include fresh vegetables and fruits.
- **Use Intensive Product:** Such products have the most environmental impact during consumption. These products are also typically extremely durable and go through multiple cycles of use. One example of such a product is an automobile.
- **Disposal Intensive Product:** These products generate the maximum impact during disposal, are typically non-biodegradable, contain hazardous substances, and are difficult to dispose of in a safe manner. Examples of such products are different types of batteries.

Cooling devices are generally manufacturing-intensive and use-intensive. By taking into account the activity of a particular device or equipment over its life cycle, and along the entire supply chain, potential areas of improvement could be identified, and the minimization and levelling of environmental burdens from one life cycle stage to another can be effected.

Benefits of the LCA Approach

1. Efficient industrial and manufacturing processes, enhanced occupational health and safety
2. Better policy creation and implementation frameworks for governmental agencies
3. More awareness for consumers, increased uptake of ecofriendly products and services

Life Cycle Climate Performance (LCCP) Indicator for air conditioners

The concept of Life Cycle Climate Performance for air conditioning and refrigeration centers around the following parameters²⁷:

- Use of Refrigerants with Low Global Warming Potential
- Use of Minimum Charge
- Zero Leakage
- Improved Energy Efficiency
- Incorporation of Green Energy

The LCCP indicator comprises a rigorous approach to identifying and quantifying direct and indirect environmental impact. The general formula for calculating LCCP is:

$$LCCP = TEWI + GWP (indirect)$$

Where

TEWI = Total Equivalent Warming Impact, which is calculated by the summation of the direct and indirect Global Warming Potential values

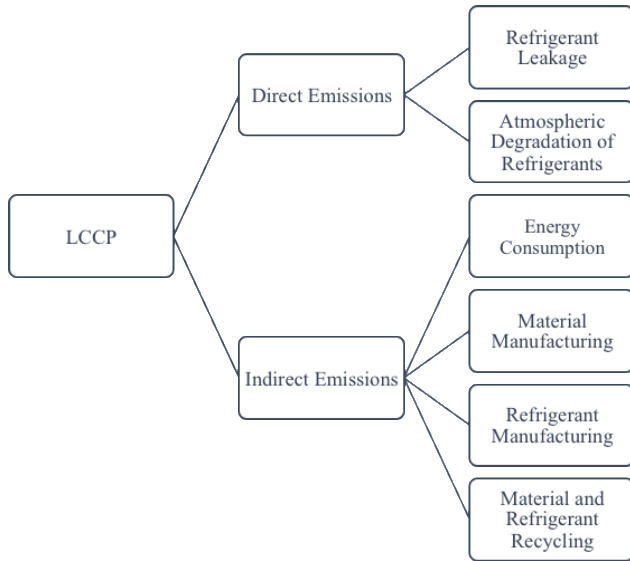
GWP (direct) = chemical refrigerant emissions, including atmospheric reaction products, manufacturing leakage, and end-of-life

²⁶ “A Review of LCA Methods and Tools and their Suitability for SMEs”; Hannele Lehtinen *et al.*, University of Manchester

²⁷ “Review of Life Cycle Climate Performance Analysis and IIR Working Party”; Yunho Hwang; Center for Environmental Energy Engineering at the University of Maryland

GWP (indirect) = energy consumption (in CO2 equivalents) emissions from chemical production and transport, manufacturing components, vehicle assembly, and end-of-life.

LCCP serves as a holistic measure of the emissions throughout the life of an air conditioning system. It gives an accurate evaluation of the global warming impact of different HVAC&R systems; it calculates emissions generated over the lifetime.



Appendix E: List of Products Certified Under Ecomark

The first *Ecomark* label was awarded to “Ezee”, a liquid detergent manufactured by Godrej.³ The complete list of products and organizations that have been awarded the *Ecomark* certification has been provided below.²⁸

Table 6: Current *Ecomark* Licensees

NAME OF LICENSEE	PRODUCTS COVERED	OPERATION STATUS
Madhya Bharat Papers Limited, Bilaspur	Writing and printing paper	Operative
Orient Paper Mills, Shahdol	Writing and printing paper	Operative
Tata International Limited, Madhya Pradesh	Finished leather products	Operative
Bajaj Eco-tec Products Ltd., Uttar Pradesh	Wood Particle Boards	Operative
Bajaj Eco-tec Products Ltd., Uttar Pradesh	Prelaminated wood particle boards	
Cascade Counsel Tech Pvt. Ltd., New Delhi	Portable Fire Extinguishers	Operative
Cascade Counsel Tech Pvt. Ltd., New Delhi	Dry powder fire extinguishers	Deferred
Mangalam Timber Products Ltd., Orissa	Medium Density Fibre Boards	Operative
Mangalam Timber Products Ltd., Orissa	Prelaminated Medium Density Fibre Boards	
Greenply Industries, West Bengal	Plywood for general purposes	Operative
Tamil Nadu Newsprint and Papers Ltd., Karur	Plain copier paper	Operative
Kutty Flush Doors and Furniture Pvt. Ltd.	Wood Flush Door Shutters	Operative
Delta Paper Mills Ltd., Andhra Pradesh	Writing and printing paper	Operative
Eco board Industries, Solapur	Medium density wood particle boards	Operative
Eco board Industries, Sangli	Wood products prelaminate particle boards	Operative
Archidply Industries Ltd., Unit-IV	Veneered decorative plywood	Operative
Vilson Particle Boards Industries Ltd.	Medium density wood particle boards	Operative
Pragati Plywood Industries Pvt. Ltd., Kolhapur	Medium density wood particle boards	Operative
Shankar Vijay Saw Mill, Kolhapur	Wood products prelaminate particle board	Operative
Satia Paper, Punjab	Writing and printing papers	Operative
Mahan Fire Protection, Himachal Pradesh	Portable water-type fire extinguishers	Operative

²⁸ Bureau of Indian Standards

Bajaj Eco-tec Products, Uttar Pradesh	Prelaminated MDF Board	Operative
Shri Bhavani Paper Mills Ltd., Uttar Pradesh	Writing and printing papers	Operative
Silicon Jewel Industries Ltd. Bharuch	Wood particle boards	Operative
Patel Kenwood Pvt. Ltd., Surat	Prelaminated particle boards	Non-operative
Shivdhan Boards Pvt. Ltd., Nagpur	Wood particle boards	Deferred
NUCHEM Ltd., Haryana	Medium density fibre boards	Operative
Shreyans Industries Ltd., Punjab	Writing and printing papers	Operative
Trident Ltd., Punjab	Writing and printing papers	Operative
Bajaj Eco-tec Products Ltd., Uttar Pradesh	Medium density fibre boards for general purposes	Operative