



# Updated Market Assessment Study for Light Commercial Air-Conditioners (LCACs)

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# List of Abbreviations

AC	Air-Conditioner
BEE	Bureau of Energy Efficiency
BIS	Bureau of Indian Standards
CAGR	Compounded Annual Growth Rate
CO <sub>2</sub>	Carbon di-oxide
EE	Energy Efficiency
FY	Financial Year
GHG	Greenhouse Gas
ICAP	Indian Cooling Action Plan
IS	Indian Standard
ISEER	Indian Seasonal Energy Efficiency Ratio
kW	kilowatt
LCAC	Light Commercial Air-Conditioner
MtCO <sub>2</sub>	Million Tons of CO <sub>2</sub>
NABL	National Accreditation Board for Testing and Calibration Laboratories
OEM	Original Equipment Manufacturer
Split AC	Split Air-Conditioner
RAC	Room Air-Conditioner
TWh	Terawatt-hours
TR	Ton of Refrigeration

# Executive Summary

With rising incomes and increasing urbanization in India, the residential and commercial building sector energy service demands are expected to expand at an exponential rate. As per Indian Cooling Action Plan (ICAP), the aggregated nationwide cooling requirement, in TR (Tons of Refrigeration), is projected to grow by around 8 times by 2037-38 as compared to the 2017-18 baseline. The building sector cooling is expected to show the most significant growth in cooling demand, at nearly 11 times compared to the current baseline, while the cold-chain and refrigeration sector is expected to grow by around 4 times the 2017-18 levels. Recognising anticipated growth of the commercial space cooling area, the Bureau of Energy Efficiency (BEE), a statutory body under the Ministry of Power, decided to develop an energy efficiency labeling program for Light Commercial Air-Conditioners (LCAC) to enable transition to efficient commercial air-conditioning appliances. Therefore, BEE developed the efficiency policy for Light Commercial Air-Conditioners and announced the Voluntary Labelling program in March 2020.

Window- and split-AC (cooling capacity below 10.5 kW) are quite prevalent in the market with a stringent labelling plan in place, and covered under IS 1391 part 1&2. They mostly find application in the residential sector. A third category of split AC (cooling capacity above 10.5 and up to and including 18 kW) has recently come under the purview of IS 1391 part 2 and consists of 3 types of products, namely, high wall mounted AC, cassette AC and floor standing AC. These ACs are split air conditioners with separate indoor and outdoor units. Cassette ACs are installed at the ceiling of any room whereas floor standing ACs are installed at any location on the floor of the room that can cover maximum area for cooling. LCACs mostly find their application in showrooms, hotels, banquet halls, restaurants, and other small / medium commercial spaces.

Given the huge opportunity in terms of the reduction potential of GHG emissions and energy consumption by Light Commercial Air-Conditioners, BEE now aims to make the labelling program mandatory to comply with the **ICAP recommendations on promoting energy efficiency in** the commercial air-conditioning sector. CLASP, with support from PwC India, is providing technical assistance to BEE in the transition to mandatory phase. The team reached out to major industry players to estimate the current market size of LCAC in India, the state of energy performance of the products available in the country, and the extent of voluntary-label penetration. The structured questionnaire and in-depth interviews provided the following insights:

1. The current market size for LCAC in FY 2020-21 is approximately **one lakh units** based on estimates from different manufacturers.
2. The segment is largely dominated by ceiling-mounted cassette type ACs constituting around 87% (in volume) of the market share.
3. Primary data received from nine leading manufacturers suggests availability of seventy-three (73) models.
4. Out of 73 models' data shared by manufacturers, sixteen (16) models (four manufacturers) are registered in the voluntary phase (< 25% penetration)<sup>1</sup>.
5. Six (6) manufacturers' (in-house) and one independent third-party test lab have NABL accreditation as per IS 1391:part-2: 2018.

The Bureau of Energy Efficiency has proposed to make the Light Commercial Air-Conditioner labeling program **mandatory instead of voluntary, with the same star rating thresholds in voluntary phase, from 1<sup>st</sup> July 2023, with a validity period of 2 years, ie., 1<sup>st</sup> July 2023 to 31<sup>st</sup> May 2025** with the following table:

<sup>1</sup> As on 24<sup>th</sup> March 2022

Indian Seasonal Energy Efficiency Ratio (kWh/kWh)

Validity 1<sup>st</sup> July 2023 - 30<sup>th</sup> June 2025

Star Rating	Minimum	Maximum
1 star	2.7	3.09
2 Star	3.1	3.39
3 Star	3.4	3.69
4 Star	3.7	3.99
5 Star		≥4.0

A cumulative savings of ~ **3.1 TWh** and ~ **2.45 MtCO2** is envisaged (by FY 2030) from the mandatory labeling program of Light Commercial Air-Conditioners.



# 1. Light Commercial Air-Conditioner (LCAC)

## INTRODUCTION

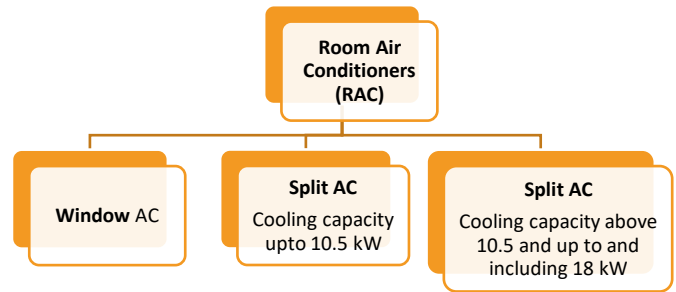
With rising incomes and increasing urbanization in India, the residential and commercial building sector energy service demands are expected to expand at an exponential rate. As per Indian Cooling Action Plan (ICAP) the aggregated nationwide cooling requirement, in TR, is projected to grow by around 8 times by 2037-38 as compared to the 2017-18 baseline. In order to meet the huge cooling demand over the next two to three decades, we need a large number of cooling appliances/equipment.

Given the increased penetration and rising market share of room air-conditioners, the Bureau of Energy Efficiency (BEE) introduced a voluntary comparative labelling scheme for air-conditioners in 2006-07. This was made mandatory in 2009-10 for air-conditioners with up to 10.5 kW cooling capacity. The efficiency levels of the labelling program have periodically been ratcheted up by BEE over the years. While the labelling program for air-conditioners with up to 10.5 kW cooling capacity has matured over the last decade, BEE has also taken initiatives to expand the scope of labelling program. Their objective is to cover the entire gamut of cooling appliances. Apart from increasing the efficiency threshold of cooling appliances for residential installation, other cooling appliances for commercial and industrial installations have also been covered under the ambit of BEE labelling program, namely chillers for both commercial and industrial application are covered. In the coming years many more cooling appliances are expected to be brought under the fold of the BEE labelling program. Treading on their vision, BEE launched the voluntary program for LCACs with a cooling capacity above 10.5 and up to & including 18 kW. These primarily consist of floor-standing, ceiling-mounted and high wall-mounted type air-conditioners. The use of such appliances has gained traction across commercial, retail and residential sectors. Although the current market share of these appliances is low in comparison to the total air-conditioner market, their share has been steadily increasing over the last 5 years (Shown in section 3).

## MARKET SEGMENTATION OF ROOM AIR CONDITIONERS

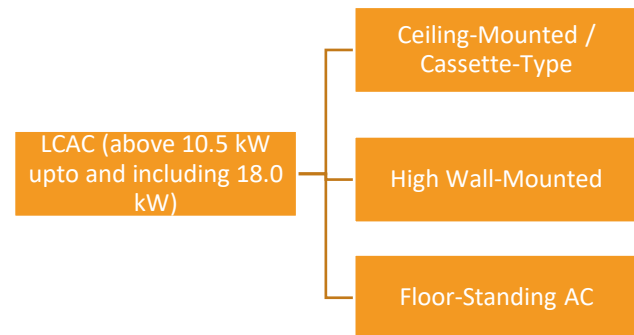
The room air-conditioner (RAC) market in India is divided into three major categories as depicted below in figure 1.

FIGURE 1: ROOM AIR-CONDITIONER SEGMENTATION



While the products of the first two categories i.e., window and split AC (cooling capacity up to 10.5 kW) are covered by the labeling program in place as per Indian Standard IS 1391 Part 1&2, the third category split AC (cooling capacity above 10.5 and up to & including 18 kW) consist majorly of 3 types of products. These are the ceiling-mounted AC (also commercially known as cassette AC), floor-standing AC and high wall-mounted AC. These have recently come under the purview of IS 1391 part 2. These two products are commonly referred to in the industry as LCAC products.

## LCAC TYPES



The cassette, floor standing and high wall mounted ACs are split air conditioners with separate indoor and outdoor units. Cassette ACs are installed at the ceiling of a room whereas floor standing ACs can be installed at any location on the floor of the room. High wall-mounted ACs are mounted on the wall. Most of the manufacturers sell cassette and floor standing AC's in the LCAC category. However, some manufacturers also have few models in high wall ACs in the category of above 10.5 kW and up to & including 18 kW. The high wall mounted AC's market share is very low in comparison to cassette and floor standing AC. The snapshot of the installations is presented in the figure 2.

FIGURE 2: SNAPSHOT OF LCAC



#### APPLICATION

Cassette, floor standing and wall mounted air conditioners of cooling capacity above 10.5 kW and up to & including 18 kW mostly find application in showrooms, hotels, banquet halls, restaurants, large residential buildings, and other small/medium commercial spaces. The ACs above 10.5 kW and up to & including 18 kW cooling capacity are categorized into single- and three-phase based on their electrical power input and cooling capacity requirement.

According to a consultation with various manufacturers, 10.5 kW- 14kW cooling capacity products predominantly fall under single-phase segment (some of them may be 3 phases as well) whereas the products ranging from 14 to 18 kW fall mostly in the 3-phase category.



## 2. Voluntary Program

### VOLUNTARY PROGRAM

BEE launched the voluntary labelling program for Light Commercial Air-Conditioners (LCAC) in March 2020, to comply with the ICAP recommendations on promoting energy efficiency in commercial air-conditioning appliances. LCAC appliances constitute a growing market share in the commercial air-conditioning segment.

The scope and other details of the voluntary labelling program are mentioned in the table 1.

The voluntary star rating shown in the table 2 was initially valid till 31<sup>st</sup> December 2021, which was further extended till 31<sup>st</sup> December 2022 due to some compelling factors primarily on account of COVID Pandemic. Based on stakeholder consultations, the star labelling program for LCAC has been proposed to be made mandatory from 1st July 2023 by BEE.

TABLE 1: SNAPSHOT OF VOLUNTARY PROGRAM

Appliance	Scope	Standard	Testing Requirements	Efficiency Metric
Light Commercial Air-Conditioners (LCAC)	Single and three phase non-ducted, fixed, and variable speed air-conditioners with rated capacity above 10.5 kW and up to & including 18.0 kW	IS 1391 (Part 2):2018	<b>Performance tests:</b> Cooling capacity test, power consumption test, power factor test, maximum operating condition test	Indian Seasonal Energy Efficiency Ratio (ISEER)

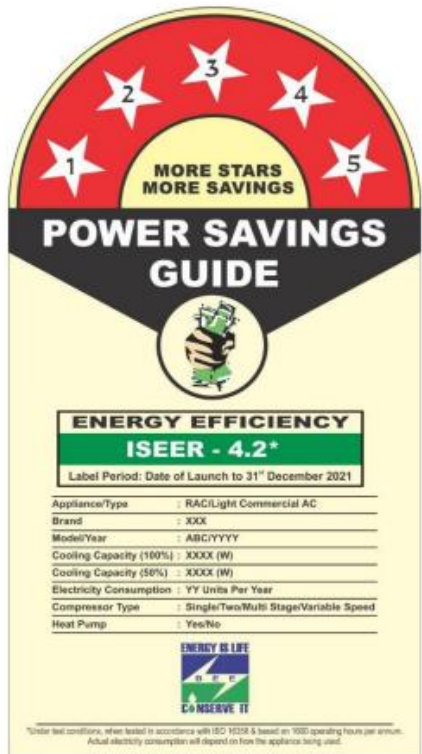
TABLE 2: VOLUNTARY STAR RATING TABLE

Indian Seasonal Energy Efficiency Ratio (kWh/kWh)		
Validity 2 <sup>nd</sup> March 2020 – 31 <sup>st</sup> December 2022		
Star Rating	Minimum	Maximum
1 star	2.7	3.09
2 Star	3.1	3.39
3 Star	3.4	3.69
4 Star	3.7	3.99
5 Star		≥4.0

Star Rating is the number of stars displayed on the energy label. The available stars are between a minimum of one and a maximum of five shown with one-star interval. The star rating of AC's sold in the Indian market is measured in terms of its Indian Seasonal Energy Efficiency Ratio (ISEER). ISEER is the ratio of the total annual amount of heat that the equipment can remove from indoor air when operated for cooling in active mode to the total annual amount of energy

consumed by the equipment during the same period. A sample label for LCAC is presented in figure 3:

FIGURE 3: STAR RATING SAMPLE LABEL



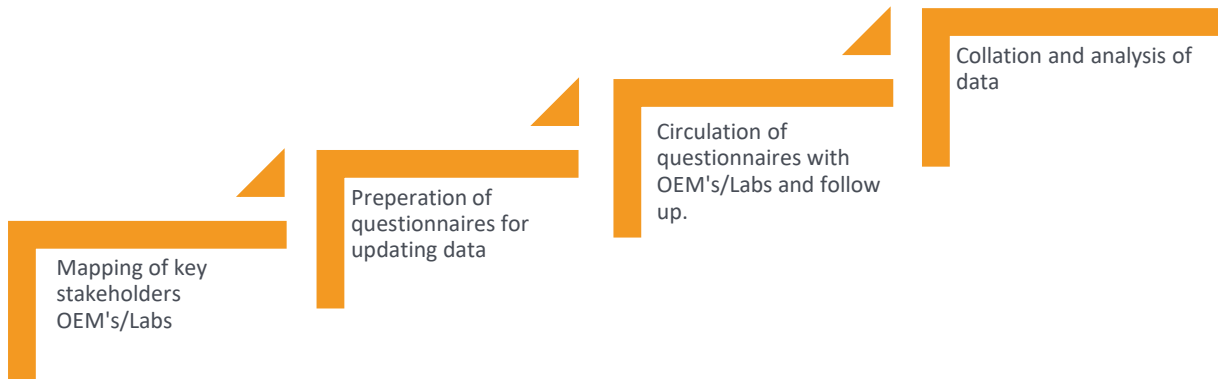


# 3. Market Assessment

## APPROACH & METHODOLOGY

Market assessment for Light Commercial Air-Conditioners was earlier conducted in 2018-19 through comprehensive questionnaires for the voluntary phase of the program. The current market assessment is built upon the earlier market assessment data to complete the tasks at hand. A robust approach comprising both primary and secondary data collection was adopted for collecting relevant market data. The overall methodology for updating the market assessment of Light Commercial Air-Conditioners is depicted in the figure 4.

FIGURE 4: APPROACH AND METHODOLOGY



The information about the market of Light Commercial Air-Conditioners was collected from both primary and secondary sources as explained below:

- Primary research was conducted through
  - Intensive individual interviews and interactions with manufacturers
  - Questionnaire-based survey: a structured questionnaire was shared with all major manufacturers to collate the required information. It included questions on the following key parameters (as listed in Appendix A):
    - **Market size:** Manufacturer sales/ market data (Units sold)
    - **Model penetration under voluntary program:** Number of models registered in voluntary phase with BEE
    - **Testing capacity:** Availability of in house and third-party testing laboratories, accreditation status, test standard followed
    - **Performance testing data:** cooling capacity, power consumption, ISEER

- Secondary research and analysis included market reports available in public domain, articles, journals, and web-based sources.

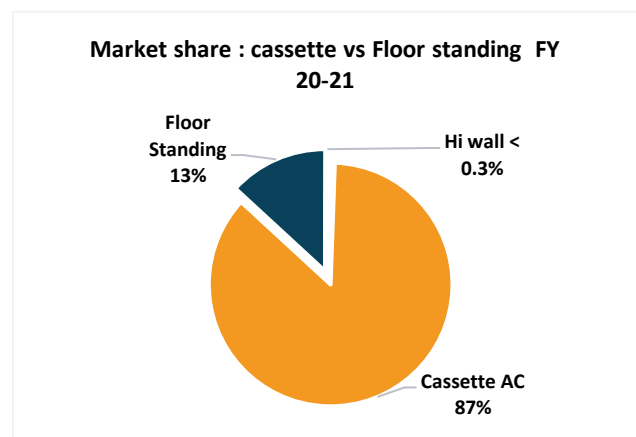
## MARKET CHARACTERISTICS

### Market Size

The market size of Light Commercial Air-Conditioners is estimated to be 1 lakh units for year FY 20-21. Analyses and estimates reveal that the segment is largely dominated by cassette ACs, which constitute around 87% of the market share as shown in figure 5. Some manufacturers also have a few models in high wall ACs for the above category. The market share is very low in comparison to cassette and floor

standing ACs. For the assessment, we also requested the manufacturers for data on import and export, however no substantial responses were received. As per our one-on-one consultations with manufacturers, the import of LCACs varies from manufacturer to manufacturer and from model to model. A few manufacturers that have manufacturing facilities in India usually import the parts and assemble the units in India, while others import the entire AC.

FIGURE 5: MARKET SHARE OF DIFFERENT LCAC TYPES





## Market size projections

As per our interaction with manufacturers, the LCAC market is expected to grow at CAGR of 10% in the future and is expected to reach 2,60,000 by FY 2029-30. The expected growth can be attributed to the following possible reasons-

- Growth of real estate, IT and other service companies in tier-2 and tier-3 cities where these products find major application
- Growth in large residential apartments, villas and small commercial spaces

## Performance Data and efficiency levels

The summary of efficiency data received from various manufacturers is as follows –

Overall, 8 manufacturers furnished data for 73 models. For the analysis and proposing threshold values, ISEER values of only 19 models were considered (Shown in Appendix B).

### Models not considered in analysis:

- 47 models (28 models of Daikin, 6 models of Panasonic, 13 models of ME) as testing is not as per Indian standard.
- 4 models of Bluestar due to unavailability of data.
- 3 models of Carrier Midea as cooling capacity are below 10.5 kW

The ISEER data of various manufacturers for – above 10.5 kW up to and including 18 kW AC segment has been summarized in the figure 6.

FIGURE 6: DISTRIBUTION OF ISEER RATINGS AS PER COOLING CAPACITY

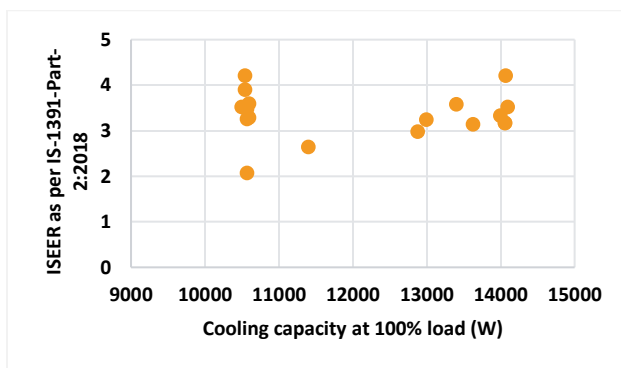
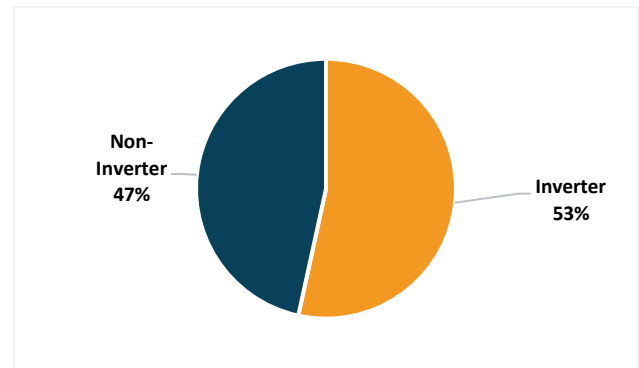


FIGURE 7: INVERTER VS NON-INVERTER LCAC MARKET SHARE



## Testing Facilities and Infrastructure

As per our interactions with manufacturers, majority of the Light Commercial Air-Conditioners in India are tested in accordance with IS 1391 part-2: 2018 standard, either in the manufacturer-owned test labs or 3<sup>rd</sup> party labs. As per manufacturers, currently 6 major manufacturers / OEM Daikin, Carrier Midea, LG, Bluestar, Hitachi, and Fujitsu General have NABL accreditation for testing as per IS 1391 part-2:2018 standard.

There are third party labs such as United laboratories (UL), Hi Physix Laboratory, Delhi Test House etc. that claim to have test facilities to test for air-conditioners above 10.5 kW. However, these labs currently do not have NABL accreditation for conducting performance testing of Light Commercial Air-Conditioners as per IS 1391 part-2 :2018. Only Sierra Air-con has NABL accreditation for testing capacity up to 13 kW.

## VOLUNTARY PROGRAM PENETRATION AND CHALLENGES FACED

Out of 73 models submitted by manufacturers, 16 are registered in the voluntary phase (< 25% penetration)<sup>2</sup>. These 16 models are from 4 manufacturers:

- Daikin with 8 cassette models
- LG with 2 cassette model
- Bluestar with 2 cassette models
- Panasonic with 4 cassette model

<sup>2</sup> As on 24<sup>th</sup> March 2022

TABLE 3: MODELS REGISTERED WITH BEE IN VOLUNTARY PHASE

The table 3 below shows the 16 registered models with BEE and their corresponding ISEER and star rating under voluntary phase. As per manufacturers, the low participation in the voluntary program can be attributed to the following reasons:

- Onset of Covid-19 pandemic just after the voluntary label program launch in 2020 led to uncertainty of supply chain and market behavior
- Volume of market size is low
- Lack of demand in commercial sector

Manufacturer	Cassette/Floor Standing	Cooling Capacity (W)	ISEER	Star rating under the voluntary phase
Daikin	Cassette	10551	4.51	5
		10510	3.35	2
		12306	3.14	2
		12661	4.1	5
		10551	3.95	4
		12661	3.85	4
		14068	3.75	4
		12661	3.85	4
LG	Cassette	10551	4.2	5
		14068	4.2	5
Panasonic	Cassette	10551	3.95	4
		10600	3.11	2
		13630	3.05	1
		14068	3.52	3
Blue Star	Cassette	10551	3.5	3
		13012	3.23	2

# 4. Transition to Mandatory Star Rating and Impact of Energy Savings and GHG Emissions Reduction

The Bureau of Energy Efficiency took an informed decision based on the updated market assessment presented by CLASP on this report. CLASP also shared the market assessment analysis shown in section 3 with Government of India, while BEE held technical committee meetings in January 2022 to update and discuss the analysis with manufacturers. Based on the productive technical committee meeting, BEE recommended that the Light Commercial Air- Conditioner labeling program be made mandatory from 1st January 2023, with a star rating table validity period of 2 years: 1st January 2023 to 31st December 2024, according to the energy efficiency matrix shown in table 4.

This is line with ICAP recommendations on promoting energy efficiency in commercial air-conditioning. The same star rating table used for voluntary program has been proposed to be made mandatory after stakeholder consultation due to the ongoing Covid-19 pandemic and to ensure maximum participation from manufacturers. This labelling program is expected to have a direct impact on the environment due to increase in electricity savings and GHG emissions reductions (shown below).

Consumers will also be able to differentiate between models and make informed choices based on efficiency levels. From our discussion with manufacturers, we learned they are optimistic about the mandatory labelling of LCAC increasing consumer awareness about the product, which will lead to increased penetration of LCAC in different consumer segments. BEE has continuously ratcheted up energy efficiency standards and the same is expected for the LCAC segment. Manufacturers continuously shape the product specifications as per the labelling program and market demand. Ratcheting up standards has led the way towards energy efficiency and introduction of more efficient products from manufacturers. While several factors, such as economies of scale and demand from consumers, play a role in driving the energy efficiency, the primary driver is technological learning, which comes at increased cost. This is tackled by manufacturers with increased localization and investments in respective R&D centers.

TABLE 4: MANDATORY STAR RATING TABLE

Indian Seasonal Energy Efficiency Ratio (kWh/kWh)		
Validity 1 <sup>st</sup> January 2023 – 31 <sup>st</sup> December 2024		
Star Rating	Minimum	Maximum
1 star	2.7	3.09
2 Star	3.1	3.39
3 Star	3.4	3.69
4 Star	3.7	3.99
5 Star	≥4.0	

## ENERGY CONSUMPTION AND PROJECT SAVINGS

This section projects the energy and GHG savings from the proposed mandatory labeling program, based on the following assumptions as mentioned in Table 5.

Based on data received from manufacturers and assumptions considered in Table 5, the energy savings and corresponding GHG emissions reductions are presented in Table 6.

TABLE 5: ASSUMPTIONS FOR BASELINE SCENARIO

Baseline Scenario 2020-21			
Segment	ISEER	Sales figure for all segments, approx.	Year over year growth till 2030 for all segments
LCAC	3.24	100,000	10%

- ISEER of 3.24 has been considered based on the average ISEER received from manufacturers as baseline efficiency for calculating savings for subsequent years.
- 10% increment in sales figure and 6% improvement in efficiency YOY has been considered as per past labelling programs by BEE
- Grid emission factor of 0.79 kg/kWh has been considered for GHG saving calculations.

Table 6: CUMULATIVE ENERGY SAVINGS AND GHG EMISSIONS REDUCTIONS

	ENERGY SAVINGS (TWH)	GHG EMISSIONS (MTCO <sub>2</sub> )	REDUCTION
LCAC	3.1	2.45	

The outcomes of assessment on cumulative energy consumption, energy savings and GHG emissions reduction by transition to mandatory labeling program for LCAC is presented on the next page.

Figure 8 shows that currently, the cumulative annual energy consumption from the sale of Light Commercial Air-Conditioners is 0.522 TWh and is expected to reach 10.5 TWh by 2030.

FIGURE 8: ENERGY CONSUMPTION PROJECTIONS FOR LCAC

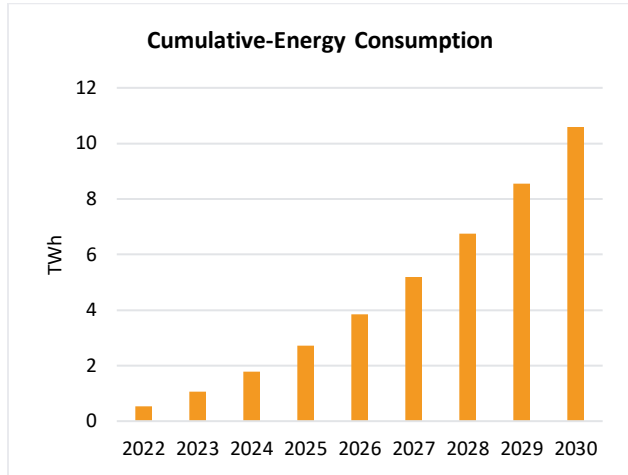


Figure 9 shows a cumulative savings of ~ 3.1 TWh is envisaged (by 2030) from the mandatory labeling program of Light Commercial Air-Conditioners.

FIGURE 9: ENERGY SAVINGS PROJECTIONS FROM TRANSITIONING TO MANDATORY LABELLING

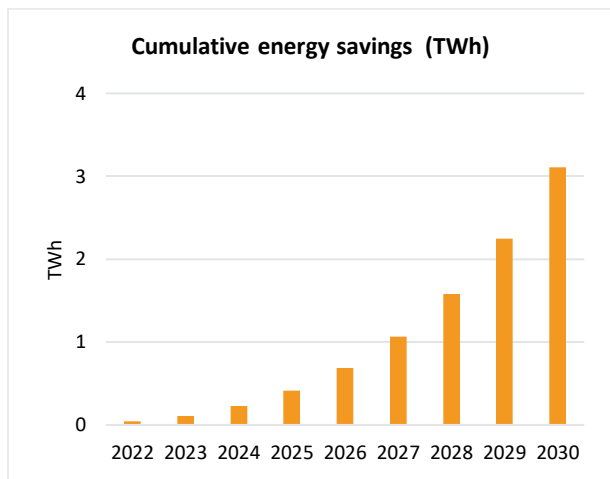
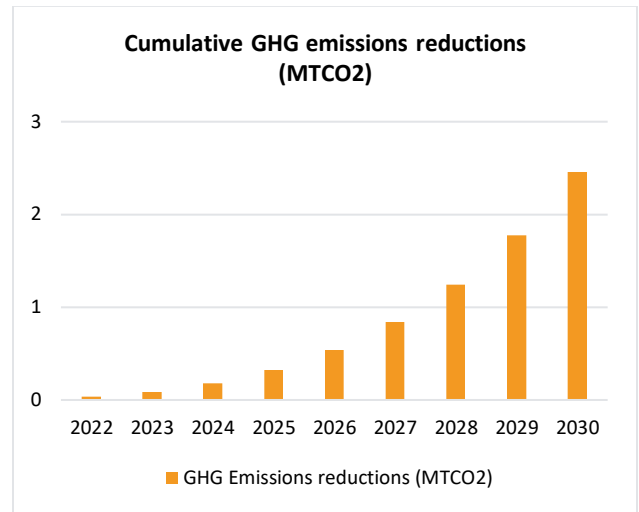


Figure 10 shows the corresponding cumulative savings of ~ 2.45 MtCO2 from the mandatory labeling program of Light Commercial Air-Conditioners by 2030.

FIGURE 10: GHG EMISSIONS REDUCTIONS (MTCO2) FROM TRANSITIONING TO MANDATORY LABELLING



## CONCLUSION

With rising incomes and increasing urbanization in India, the residential and commercial building sectors' energy service demands are expected to expand at an exponential rate. As per Indian Cooling Action Plan (ICAP), the aggregated nationwide cooling requirement, in TR (Tons of Refrigeration), is projected to grow by around 8 times by 2037-38 as compared to the 2017-18 baseline. The building sector cooling shows the most significant growth in cooling demand, at nearly 11 times compared to the current baseline.

Window and split ACs (with cooling capacity below 10.5 kW) are quite prevalent in the market with a stringent labelling plan in place and covered under IS 1391 part 1&. They mostly find their application in the residential sector. The third category split AC (cooling capacity above 10.5 and up to & including 18 kW) has recently come under the purview of IS 1391 part 2, which consist of 3 types of products: high wall-mounted AC, cassette AC, and floor-standing AC.

The market size of Light Commercial Air-Conditioners is estimated to be 1 lakh units for year FY 20-21 and is expected to reach 2,60,000 by FY 2029-30.

Recognising anticipated growth of the commercial space cooling area, the Bureau of Energy Efficiency (BEE), a statutory body under Ministry of Power, developed an efficiency policy for Light Commercial Air-Conditioners and announced the Voluntary Labelling program in March 2020. This is prompted by the huge opportunity in the reduction potential of GHG emissions and energy consumption, based on the updated market assessment presented by CLASP through this report. CLASP also shared the market assessment analysis shown in section 3 with Government of India, and BEE held technical committee meetings in January 2022 to update and discuss the analysis with manufacturers. After the productive technical committee meeting, BEE recommended that the Light Commercial Air- Conditioner labeling program be made mandatory from 1<sup>st</sup> January 2023, with a star rating table validity period of 2 years, starting from 1<sup>st</sup> January 2023 to 31<sup>st</sup> December 2024, according to the energy efficiency matrix shown in table 7.

Indian Seasonal Energy Efficiency Ratio (kWh/kWh)		
Validity 1 <sup>st</sup> January 2023 – 31 <sup>st</sup> December 2024		
Star Rating	Minimum	Maximum
1 star	2.7	3.09
2 Star	3.1	3.39
3 Star	3.4	3.69
4 Star	3.7	3.99
5 Star	≥4.0	

# Appendix A: Survey Questionnaire

## General Details and estimate of market size of LCAC

LCAC manufacturer details						
Name of Manufacturer	Manufacturing facility address (in case of multiple facilities enter address in the next row)	Manufacturing facility capacity (of each facility in case of multiple)	Name of concerned representative for LCAC	Designation of the representative	Contact Number of the representative	Email_Id of representative

Estimate of total market size for all Suppliers / OEM's pan India : Light Commercial Air-Conditioner (10.5 kW up to & including 18 kW)				
S. No.	Type	FY 18-19	FY 19-20	FY 20-21
1	Market size for Cassettes -Single Phase ( Quantity in nos.)			
2	Market size for Cassettes -Three Phase ( Quantity in nos.)			
3	Market size for Floor Standing-Single Phase ( Quantity in nos.)			
4	Market size for Floor Standing-Three Phase ( Quantity in nos.)			
5	Market size for wall mounted-Single Phase ( Quantity in nos.)			
6	Market size for wall mounted-Three Phase ( Quantity in nos.)			

## Manufacturer market / sales data

Market size : Light Commercial Air-Conditioner 10.5 kW up to & including 18 kW ( in nos.)					
S. No.	Light Commercial Type	Tonnage	FY 18-19	FY 19-20	FY 20-21
1	Cassette Single Phase	3 to 5 TR			
2	Cassette Three Phase	3 to 5 TR			
3	Floor Standing Single Phase	3 to 5 TR			
4	Floor Standing Three Phase	3 to 5 TR			



**Manufacturer Import quantity : Light Commercial Air-Conditioner 10.5 kW up to & including 18 kW ( in nos.)**

<b>S. No.</b>	<b>Light Commercial Type</b>	<b>Tonnage</b>	<b>Major Countries of import</b>	<b>FY 18-19</b>	<b>FY 19-20</b>	<b>FY 20-21</b>
1	Cassette Single Phase	3 to 5 TR				
2	Cassette Three Phase	3 to 5 TR				
3	Floor Standing Single Phase	3 to 5 TR				
4	Floor Standing Three Phase	3 to 5 TR				

**Manufacturer Export quantity : Light Commercial Air-Conditioner 10.5 kW up to & including 18 kW ( in nos.)**

<b>S. No.</b>	<b>Light Commercial Type</b>	<b>Tonnage</b>	<b>Major Countries of import</b>	<b>FY 18-19</b>	<b>FY 19-20</b>	<b>FY 20-21</b>
1	Cassette Single Phase	3 to 5 TR				
2	Cassette Three Phase	3 to 5 TR				
3	Floor Standing Single Phase	3 to 5 TR				
4	Floor Standing Three Phase	3 to 5 TR				

## Voluntary Program Penetration

Voluntary program penetration data : Light Commercial Air-Conditioner 10.5 kW up to & including 18 kW			
S. No.	Type of Light Commercial	Total no of models in product portfolio	Total no. of models labelled as per voluntary program
	Cassette (3 to 5 TR)		
	Floor Standing (3 to 5 TR)		

## Laboratory and test standard details

Type of tests conducted				
	Type tests	Acceptance tests	Routine tests	Tests as per international standards, if applicable
<i>Please choose type test from drop down</i>	In house laboratory	In house laboratory	In house laboratory	
<i>Please choose type test from drop down</i>	Other labs in India	Other labs in India	Abroad	
<i>Please choose type test from drop down</i>	Abroad	Abroad	Abroad	

Test standard details				
Test standards category	IS No.	ISO No.	IEC No.	others

**Please mention standard numbers**

# Appendix A: Cooling Capacity and Efficiency Data received from manufacturers

Reference	IS 1391 part-2 Followed	Type	Inverter/ Non-Inverter	Cooling Capacity at 100% load (W)	ISEER
M1	Yes	Cassette	Inverter	10550	3.9
		Cassette	Inverter	10550	4.2
		Cassette	Inverter	13400	3.57
		Cassette	Inverter	14070	4.2
		Floor Standing	Inverter	10600	3.58
		Floor Standing	Inverter	14000	4.2
M2	Yes	Cassette	Non-Inverter	10577	3.47
		Cassette	Non-Inverter	10577	3.25
		Cassette	Non-Inverter	14064	3.16
		Cassette	Non-Inverter	14064	3.16
M3	Yes	Cassette	Non-Inverter	10574	2.07
		Cassette	Inverter	10600	3.28
		Floor Standing	Non-Inverter	11401	2.64
		Cassette	Inverter	12880	2.97
M4	Yes	Cassette	Non-Inverter	10500	3.51
		Cassette	Non-Inverter	13600	3.13
M5	Yes	Cassette	Inverter	10550	3.5
		Cassette	Inverter	13000	3.23
M6	Yes	Cassette	Inverter	14100	3.52

