



Air Conditioner Energy Efficiency Benchmark 2021

Background:

This Document identifies current technologies that is available in Market and used in buildings in Bangladesh and recommends Alternative energy-efficient cooling technology best suited to the country.

Purpose:

The purpose of this Document to identify Average Energy Efficiency Benchmark for Air Conditioner, So that it can be used to prepare Labeling Criteria for Air conditioner.

Methodology:

The information on energy-efficient equipment specifications and costs is collected from both primary and secondary sources. The primary sources includes onsite market verification, interviews, and Sales data of manufacturers or the association of the equipment manufacturers. Some of the import data is collected from the National Board of Revenue (NBR) to cross-verify the market share of the different equipment manufacturers. The secondary sources of data is collected mainly from the website of the equipment manufacturers. In addition, various research reports, news articles, and similar previous studies by SREDA and other institutions will provide secondary data.

Scope:

This Document is deals with Refrigeration and Air conditioning unit used in residential sector. This includes Unitary Air Conditioner like Split type Air Conditioner, Window Air Conditioner etc.

Energy Efficiency Component:

The possible improvements in energy efficiency depend on the unit under consideration, the already Existing Energy Efficiency Ratio (EER), the refrigerant, climatic conditions and cooling capacity. The Ideal refrigeration cycle, assuming constant load, infinite-sized heat exchangers and 100% efficient Compressors, has a Coefficient of Performance (COP)

Air Conditioner Market:

Single split-type ACs are the most widely used UAC in Bangladesh. Among them, ACs with capacities of 12,000, 18,000 and 24,000 BTU-hour are mostly used in residential buildings and offices. According to Bangladesh’s Refrigerator and Air Conditioning Manufacturing and Exporters Association, around 420,000 single split ACs were sold on the local market, where the capacity of 18,000 BTU accounted for more than 60% of the local sales. The growth rate of the UAC market (excluding VRF) is shown in Figure 1.



Figure 1: UAC (without VRF) market size and growth rate in Bangladesh

Through a market survey, it was found that AC units using R22 and R410A refrigerants still dominate the Bangladeshi market. However, the trend is moving toward R410A, due to the reduced R22 import quota set by the DoE. Local manufacturers which are the stakeholders of the retrofitting project under MLF projects are working to develop R290-based ACs for capacities of 12,000 BTU and 18,000 BTU. For capacities above 18,000 BTU such as 24,000 BTU, 48,000 BTU and 60,000 BTU, manufacturers are working to develop and establish R32-based ACs due to the (currently) limited charge allowed for R290 flammable refrigerants. R32 has a relatively low GWP (GWP=675) compared to conventional refrigerants but is mildly flammable. UNEP and UNDP facilitate various trainings for local technicians to be able to handle mildly flammable refrigerants in ACs. Currently, the main challenge for local manufacturers is the procurement of R290-based compressors.

The R290 split ACs can achieve an EER between 4 and 5 for cooling capacities of 18,000 BTU and a SEER between 6 and 7 for cooling capacities between 9,000 and 12,000 BTU. Bangladesh’s best available R32 split AC appliances achieve an average **EER of 3.6**, a slightly higher value compared to available AC units in other countries and regions.

Findings of Market Research:

- It was found that AC units using R22 and R410A refrigerants still dominate the Bangladeshi market
- Price difference between inverter and non-inverter models are minimal.
- Price difference reflects more of other functional differences like air refreshing, ambient controlling, space-saving design and others (there are cases where non-inverter-controlled models are more expensive than the inverter-controlled ones).
- Energy saving features by inverter-controlling is not reflected in EER figures.
- Almost all of the brands are already offering both inverter-controlled and non-inverter-controlled selections.

Benchmark for Air Conditioner for Bangladesh

Below Table depict the **average benchmark** for Air Conditioner Performance based on Energy Efficiency ratio.

No	Capacity (TON)	Type	Energy Efficiency Ratio (EER)	COP
01	1-2	Split type	3.64	3.146
02	2- 4.5	Split	3.05	2.9
03	Over 4.5	Multi Split, VRF	3.98	3.67

Recommendation

- EER (or COP) is an indicator to measure and compare the energy efficiency performance at almost continuous full load, therefore the benefit of inverter-controlling will not be reflected. EER may be used as a criterion for minimum standard (say over 2.9), but will have minimal effect to the market.
- An indicator taking into account the seasonal fluctuation of temperature should be introduced. Regional Seasonal Energy Efficiency Ratio (SEER) or Other International standard energy consumption may be referred to as the examples.