

Cooling Efficiency in Indonesia: Recent Achievements and Future Outlook

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According to the International Energy Agency (IEA), energy use associated with space cooling tripled between 1990 and 2016, making it the fastest growing end-use in buildings. This rapid growth is influenced by conditions in developing countries including growing populations, increased urbanization, electrification, rising incomes, and prices falling for air conditioning (AC) equipment. In economies with increasingly hot climates, the growth in AC stock will have a large-scale impact on electricity generation capacity, peak load, and greenhouse gas emissions if no additional policy measures are taken. This policy brief summarizes the progress to date and future recommendations to mitigate the negative impacts of this expected future demand by improving the efficiency of room ACs in Indonesia¹.

In December 2019, a new minimum energy performance standard (MEPS) and 5-star label scheme have been agreed upon by the Ministry of Energy and Mineral Resources (MEMR) and its stakeholders. This revision includes a Cooling Seasonal Performance Factor (CSPF) metric, consistent with international best practice and a significant improvement of the label categories over the MEPS/1-Star level. The highest efficiency category is now set at 60% over the MEPS, which will help transform the market towards efficient ACs.

Table 1. MEMR Proposed Decree regarding Indonesia single split AC MEPS and Label (2020)

Star Level	Efficiency in CSPF (Btu/(W.hr))	Equivalent
1 Star (MEPS)	10.58	ASEAN SHINE 2020 target
2 Star	11.60	NA
3 Star	12.96	NA
4 Star	14.33	NA
5 Star	17.06	Thailand 5-Star Label (2019)

Note: MEMR's MEPS and Label program currently covers single-split ACs up to 27,000 Btu/hr (8 kW)

However, the MEPS target remains low, even below the MEPS China adopted in 2010 (10.91 Btu/(W.hr)). Because China manufactures about 70% of the world's single-split ACs, and its domestic market accounts for roughly 30% of global AC sales, the low MEPS fail to capture the economies of scale, low upfront costs, and significantly higher life-cycle savings and environmental benefits that could be realized by aligning with China's MEPS. The 5-Star label threshold is also 43-50% less than the efficiency of global best available products (CSPF ~30-34 Btu/hr/W).

LBNL's analysis suggests that an increase of Indonesia's AC MEPS and rescaling of the energy label program should be considered at the levels shown in Table 2 to align with ASEAN, China and the United Nations Environment Program (UNEP)'s United for Efficiency (U4E) Model Regulation Guidelines², which are consistent with where major markets are headed.³

¹ In general, window and unducted split ACs fall into the general rubric of "room ACs". The global room AC market is dominated by unducted split (also known as single split or mini-split) ACs (Shah et al., 2013)

² The U4E Initiative has developed "Model Regulation Guidelines" to encourage countries to implement an integrated policy approach through energy-efficient products to bring about sustainable and cost-effective transformation. U4E's model regulation provides guidelines and core requirements for energy efficiency, refrigerants, testing, and functional performance. More information available at: <https://united4efficiency.org/resources/model-regulation-guidelines-for-energy-efficient-and-climate-friendly-air-conditioners/>

³ Letschert et al., 2020. Accelerating the Transition to More Energy Efficient Air Conditioners in Indonesia. LBNL report available at: https://eta-publications.lbl.gov/sites/default/files/lbnl_report_indonesia_acs_2020_1.pdf



Table 2. Proposed Revision to the Indonesia AC MEPS and Label

Star Level	Efficiency in CSPF (Btu/(W.hr))	Equivalent
1 Star (MEPS)	12.68	20% above ASEAN SHINE 2020 target
2 Star	15.43	Singapore (2020)
3 Star	20.79	U4E MEPS/Potential China MEPS (2022)
4 Star	24.96	China Grade 1 (2020)
5 Star	27.46	U4E Top Tier

Note: Recommended MEPS and Label program cover mini-split ACs up to 16 kW (55,000 Btu/hr)

LBNL estimates that 12–26% of Variable Speed Drive ACs currently available in major emerging economies meet the levels proposed for 2022 (China) or 2023 (Model Regulation Guidelines).⁴ One of the greatest concerns within Indonesia regarding ambitious MEPS and labels is the first cost impact to price-sensitive consumers, and the investments necessary to produce more efficient equipment. The LBNL report explores a complementary policy package intended to drive cost down and encourage adoption of efficient technology by consumers, and identifies areas for technical assistance that would support Indonesian government priorities. The policy package includes the following options:

- Consumer awareness and education program
- Green Public Procurement
- Buyer's Club programs
- Utility rebate programs and/or on-bill financing
- Manufacturer incentives

One of these options, Green Public Procurement (GPP) is currently implemented by the German development agency GIZ GmbH in collaboration with MEMR.⁵ The Ministry of Environment and Forestry (MOEF) has adopted a plan for GPP and begun an inter-agency consultation process to roll out the green procurement requirements progressively in various provinces. The current requirements also refer to the AC star-rated label. Because of the addition of a fifth star to the labeling program, we recommend that MOEF's green procurement also consider adoption of the 5-star for public procurement (current and future levels set by MEMR). Through GPP, the Indonesian government can act as pioneer in demonstrating the benefits of efficient and climate-friendly cooling.

With the U4E Model Regulation Guidelines on ACs being considered in other Southeast Asia countries and more broadly, the Top Tier/recommended 5-star level will become more widely available, creating economies of scale, which will in turn drive costs down and encourage consumer adoption of efficient technology. By transforming the market towards the recommended 5-star level/U4E Top Tier, Indonesia's power sector could avoid up 5GW of demand (worth an additional US\$ 10 billion), 28 TWh annual electricity savings by 2035 and up to 182 Mt of CO₂

⁴ Model Regulation Guidelines for Energy Efficient and Climate Friendly Air conditioners – Supporting Information. Available at https://united4efficiency.org/wp-content/uploads/2019/11/U4E_AC_Model-Reg-Supporting-Info_20191029.pdf

⁵ Green procurement is the process of finding, buying, and obtaining services and technology that are environmentally friendly while replacing outdated technology. Cooperation on GPP for ACs was started within the International Climate Initiative (IKI) funded Green Chillers project and planned within a K-CEP funded project. Next to a 5-star level, the project recommends a refrigerant GWP of 10 or below.



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emissions between 2021-2035, while Indonesian consumers save over US\$6.1 billion through 2035 and local industry increases its value by US\$22.4 million.



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