13 CLIMATE ACTION

# CASE STUDY TITLE

Climate Change Mitigation through Electrical Appliance Market Transformation

## SUMMARY

The objective of this case study is to prove that Minimum Energy Performance Standards (MEPS) are effective means to reduce carbon emissions, as well as deliberate market intervention policies that facilitate the uptake of energy-efficient appliances. More specifically, the case study takes into account the retrofit of energy-efficient lighting and the transformation of household refrigerator market strategies put into place by the government of Ghana.

The resulting drastic reduction in consumption benefitted consumers in terms of avoided bill payments, while it had even more evident positive implications on the environment and the economy of Ghana at large.

## AT A GLANCE

### COUNTRY

- Ghana

### LEVEL

- National

### SDG ADDRESSED

- SDG 13 - Climate Action

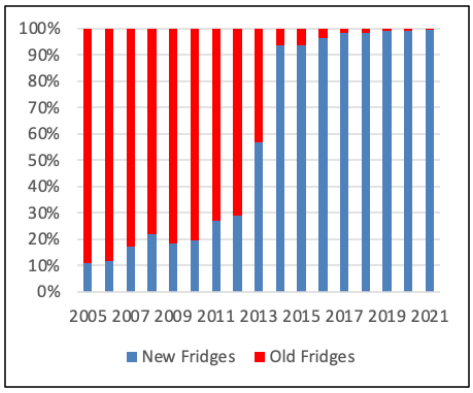
## BACKGROUND

In the early 1990s, population growth, economic expansion and drought-induced low output of the hydro dams, coupled with a thriving appliance market generated a gap between demand and supply of power. Such a discrepancy was worsened by the use of second-hand, inefficient appliances imported from Europe and elsewhere, which resulted in an estimated loss amounting to 30 per cent of the total generated electricity. Mandatory energy efficiency standards and labelling programmes were introduced to solve the problem.

## STRATEGY

Minimum Energy Performance Standards(MEPS) were developed for lighting and air-conditioning appliances in 2005, followed by refrigerating appliances in 2008. The MEPS for lighting, air conditioners and refrigerators were set, respectively, at 33 lumens per watt, an energy efficiency ratio (EER) of 2.8 and 600 kWh per year. Additionally, authorities imposed a ban on the importation of used refrigerating appliances, used air- conditioners and incandescent lamps

Figure A: Evidence of Transformed Market through MEPS from 2005 - 2021




Source: Energy Commission 2021

Between 2007 and 2008, the government of Ghana also designed and

## STRATEGY

implemented targeted market intervention and fiscal policy measures, including the import of six million Compact Fluorescent Lights (CFLs) to be distributed at no cost to consumers as a replacement for incandescent bulbs. Furthermore, a rebate scheme was put in place between 2012 and 2015 with the aim of facilitating the switch from used, inefficient refrigerators to brand-new, efficient ones. Additional personnel were posted to the main ports to rigorously enforce the ban on the importation of the prohibited electrical appliances and lighting devices.

The standards for the three existing appliances (air-conditioners, Refrigerators and lighting) have been revised in line with the international trend and standards have been developed for additional fifteen appliances. The prohibition laws have also been revised to make them stringent and also to cover all the appliances that are covered under the appliance standards and labelling regime. This is aimed at preventing Ghana from becoming a dumping ground for used, inefficient and obsolete appliances.

To transit from minimum energy performance standards (MEPs) to high energy performance standards (HEPS), Ghana is currently implementing an ECOFRIDGES project in collaboration with the United for Efficiency (U4E), where both market and innovative financial mechanisms are employed to assist salary workers to be able to buy high energy-efficient cooling appliances at a zero interest rate for a period of twelve months. Within one year, the project has succeeded in putting into homes and offices over one thousand high energy-efficient cooling appliances.

## RESULTS & IMPACT

The lighting retrofit resulted in reducing the peak load by 124MW, saving 452MWh of energy per day (which translates into US$ 39.5M per year), and saving 105,000 tons of CO2. Additionally, between September 2007 and September 2009, the penetration rate of energy-efficient lighting technology increased exponentially, from 3 per cent to 79 per cent, whilst that of incandescent bulbs decreased from 58 per cent to 3 per cent.

The refrigerator rebate scheme led to the replacement of over 10,000 inefficient refrigerators being used in homes with new and efficient ones. This translated into savings of 400 GWh of electricity and 1.1 million tons of CO2. Finally, between November 2012 and December 2015, the average annual refrigerator consumption dropped from 1,200 kWh per unit to 385 kWh.

The ECOFRIDGES GO project has resulted in the following numbers on the sale of energy-efficient equipment from October 2020 to December 2021; (1,337 new refrigerators and ACs sold, finance mobilised (GHS 4.1 million), reduction in energy consumption 12'183 MWh) of total energy savings and noting the importance of peak load when it comes to ACs, reduction in direct and indirect GHG emissions (10,166 tonnes CO2).

## CHALLENGES & LESSONS LEARNED

The Energy Commission, the implementing institution faced a number of challenges when implementing the MEPS. These included insufficient institutional collaboration between the organisations concerned, such as the Ghana Shippers Authority, and other stakeholders whose support would have been instrumental to the success of the program; the lack of laboratories to perform verification tests on the appliances; frequent bribery attempts and political interferences.

The lessons learned, on the other hand, were many, and featured, inter alia, strengthened system leadership and institutional engagement. This was achieved by including officials from several institutions in the steering committees of various undergoing projects, who then became the gatekeepers for the Energy Commission in their respective organisations. Furthermore, in the absence of test laboratories, the Energy Commission managed to adapt existing structures like internationally accredited test laboratories to carry out the aforementioned tests, instead of waiting for new laboratories to be established.

## POTENTIAL FOR REPLICATION

The experience is replicable in several developing countries, especially Sub-Saharan Africa which represents a fertile ground for the replication of the strategies implemented to increase the uptake of energy-efficient products in Ghana due to similarities in socio-economic and cultural circumstances.

Following this lead, Nigeria and Senegal have indeed adopted MEPS, establishing themselves as the only countries in West Africa to have done so. The ECOWAS Center for Renewable Energy and Energy Efficiency (ECREEE) is currently working on the harmonization of standards in the West African sub-region to encourage replication of Ghana's energy efficiency experience.

**CASE STUDY DEVELOPED BY:**
**Kofi Adu Agyarko**
**Energy Commission**
**Ghana**