An Overview of the Energy Consumption Patterns of Refrigeration Appliances in Nigeria *

By the

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*Being Paper Presented at the Technical Committee Meeting on Household Refrigeration Appliances held at Sheraton Hotels and Towers, Mobolaji Way, Lagos, Nigeria on Thursday, 24th July 2014

Presentation Outline

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Introduction

- United Nations Development Programme (UNDP) with support from the Global Environment Facility (GEF) and in Collaboration with the Energy Commission of Nigeria and the Federal Ministry of Environment (FME) commenced the implementation of this project to promote energy efficiency in Nigeria.

- The overall objective of the project is to improve the energy efficiency of series of end-use appliances (lighting, air conditioner, refrigerators, fans, heating equipment etc) used in Nigeria through policy and legislative instruments and demand-side management programme.

- Part of the activities to achieve the objective of the project is to set minimum energy performance standards (MEPS) for end-use appliances notably lighting, air conditioners and refrigerators within the project life span.

Introduction Contd.

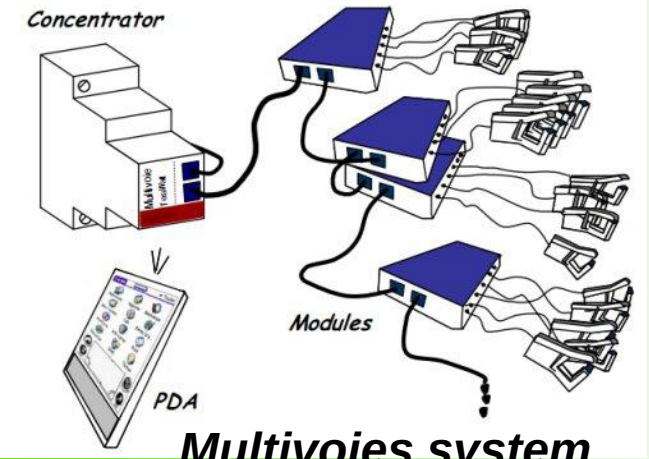
- Before standards are set, it is important to understand current level of efficiency, which will guide the setting of MEPS.

- To gather baseline data that will help to set MEPS for selected appliances, end-use monitoring study was carried out across the six geopolitical zones of the country (Lagos, Enugu, Benin, Abuja, Sokoto and Bauchi).

- The objectives of the study was to assess the current level of energy efficiency of some appliances (lighting, refrigerators and air conditioners) used in Nigeria in order to set minimum energy performance standard (MEPS) for these appliances.

- It is therefore important that an overview of the results of the study that concerns this meeting be presented. So, based on the results of the study, I will briefly present the baseline annual energy consumption data for refrigerators and air-conditioners in Nigeria that will help us set MEPS for these appliances.

Methodology

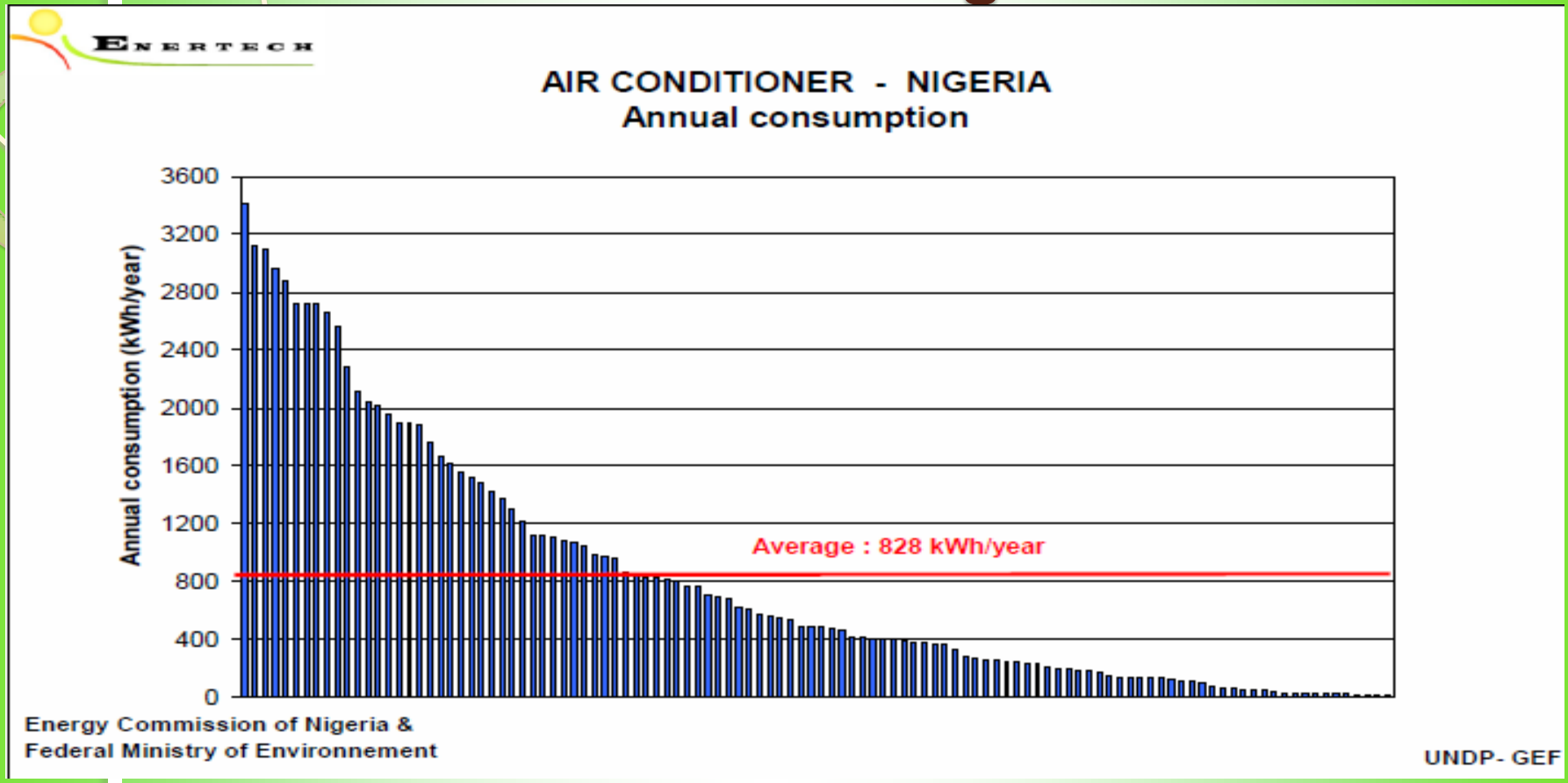


Multivoies system

- **The energy consumptions of the cold appliances (fridge, freezer, fridge-freezer) were monitored using Wattmeters connected in series with the appliances.**
- **The serial wattmeter was directly plugged into the wall sockets.**
- **The household appliance to be monitored was then connected in the trailing socket of the wattmeter.**
- **Some appliances (Air conditionning, Mains, Lights) were monitored directly from the main switchboard of the household.**
- **These measurements were done using the Multivoies system which was installed inside the Distribution Box (or fuse box).**

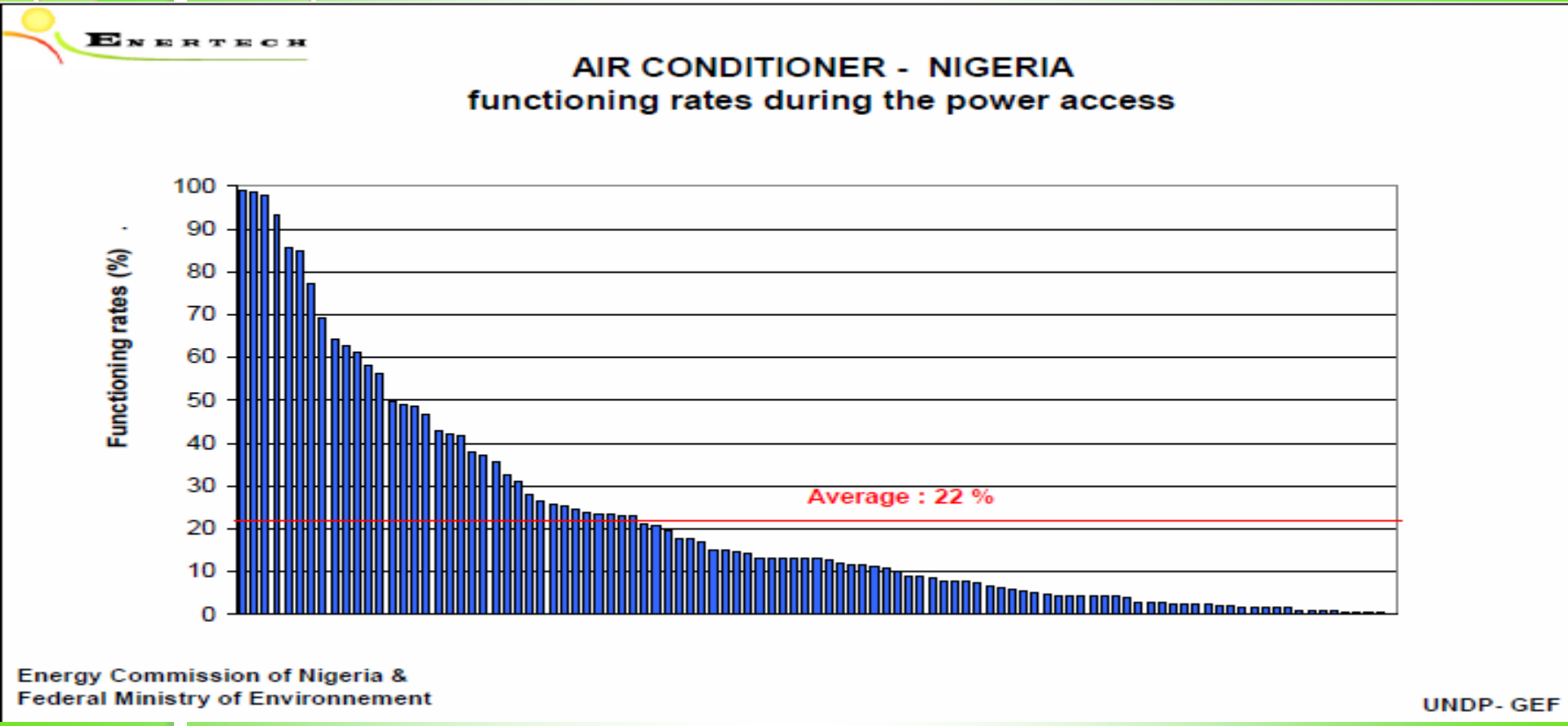
- **The inside temperature were monitored using thermometers.**

Annual Energy consumption for the air conditioners in Nigeria



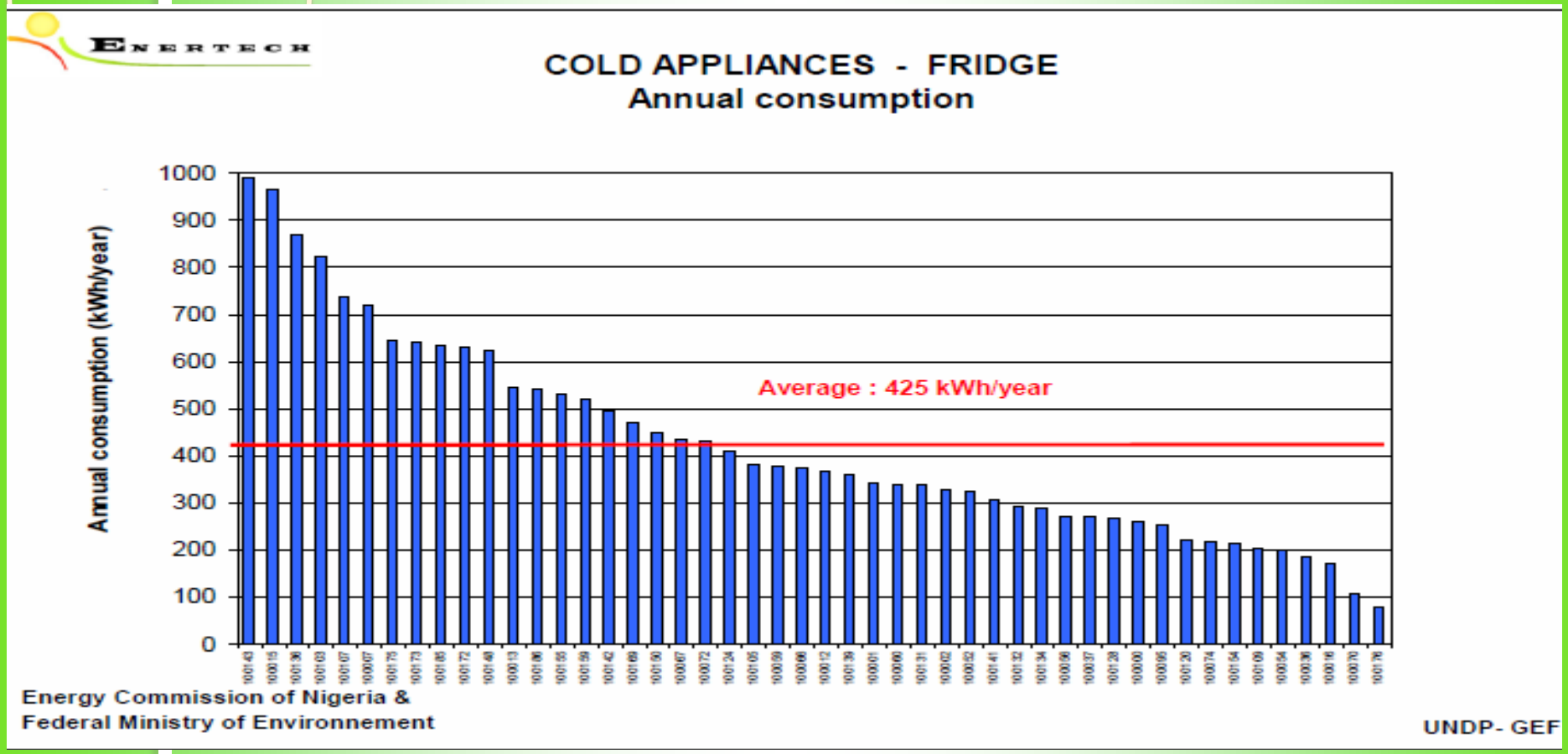
There is a large gap between the air conditioners consumption. The consumptions per household goes from 0 kWh/year to 3400 kWh/year with an average value of 828 kWh/year.

Functioning rates when power is available



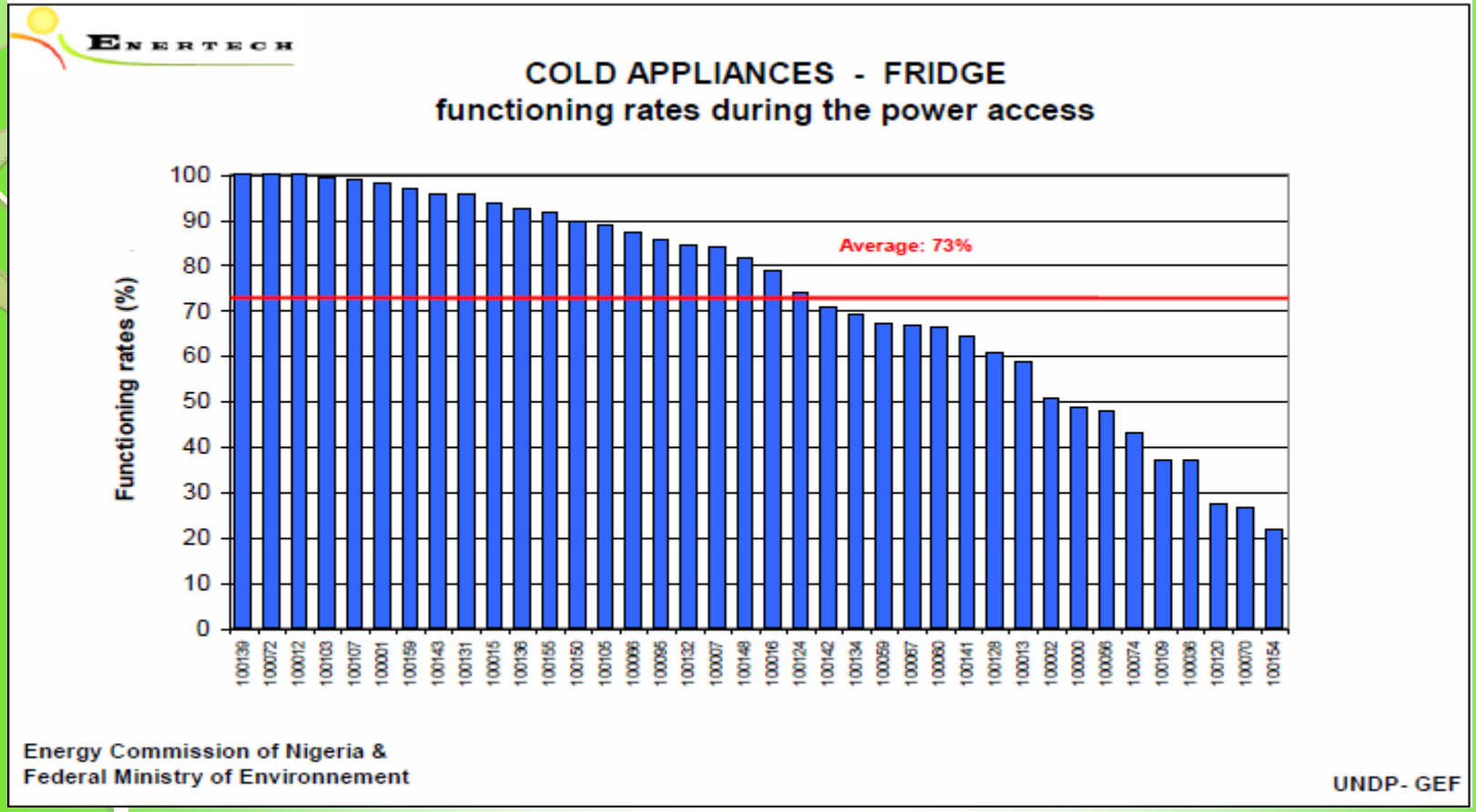
- **This Figure shows the functioning rate during the power access. The values are in the range 0 (never used) - 100% (always on) for an average value at 22%.**
- **This indicates that air-conditioners are not always switched ON, hence the poor power ON cycles.**

Annual consumption for the fridges (or refrigerators).



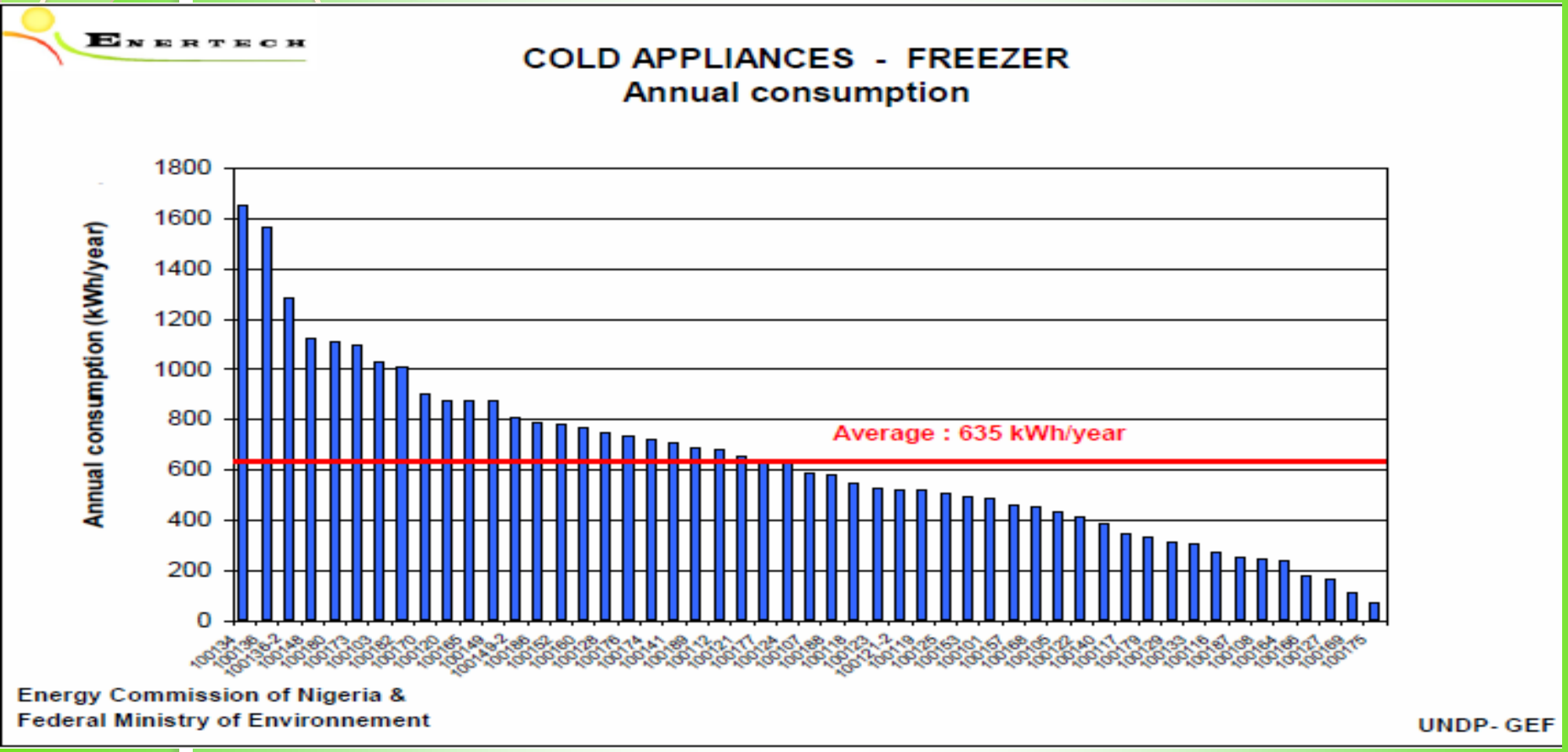
- The consumptions per household was from less than **100 kWh/year to 1000 kWh/year. The average value of 425 kWh/year**

Functioning rates during power access



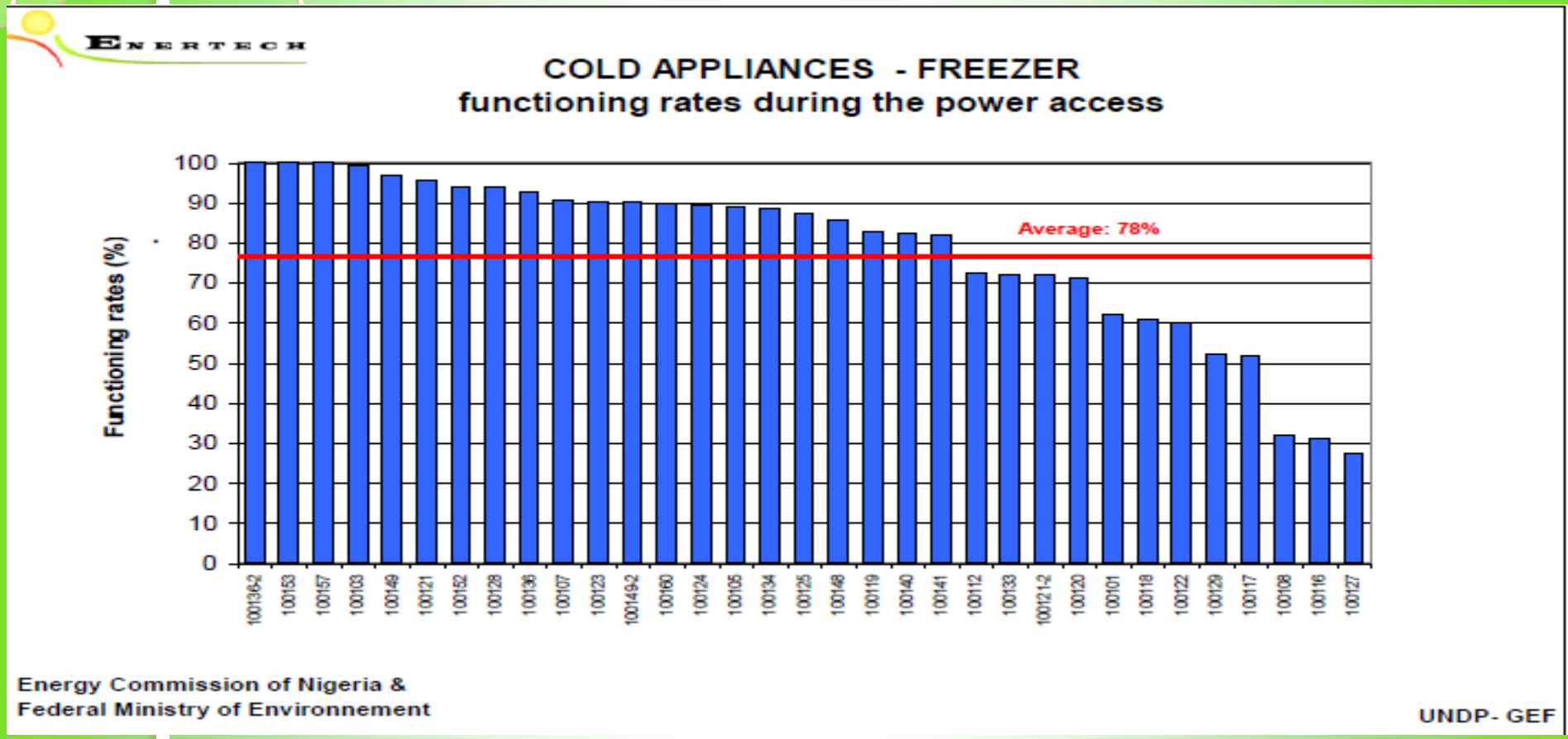
- The Figure shows the functioning rate when power is available.
- The values goes from 20 to 100% and the average value of 73% is very high for that type of equipment.
- This is explained by the frequent power outage that leads to very long compressor cycles.

Annual consumption for the freezers (or upright freezers).



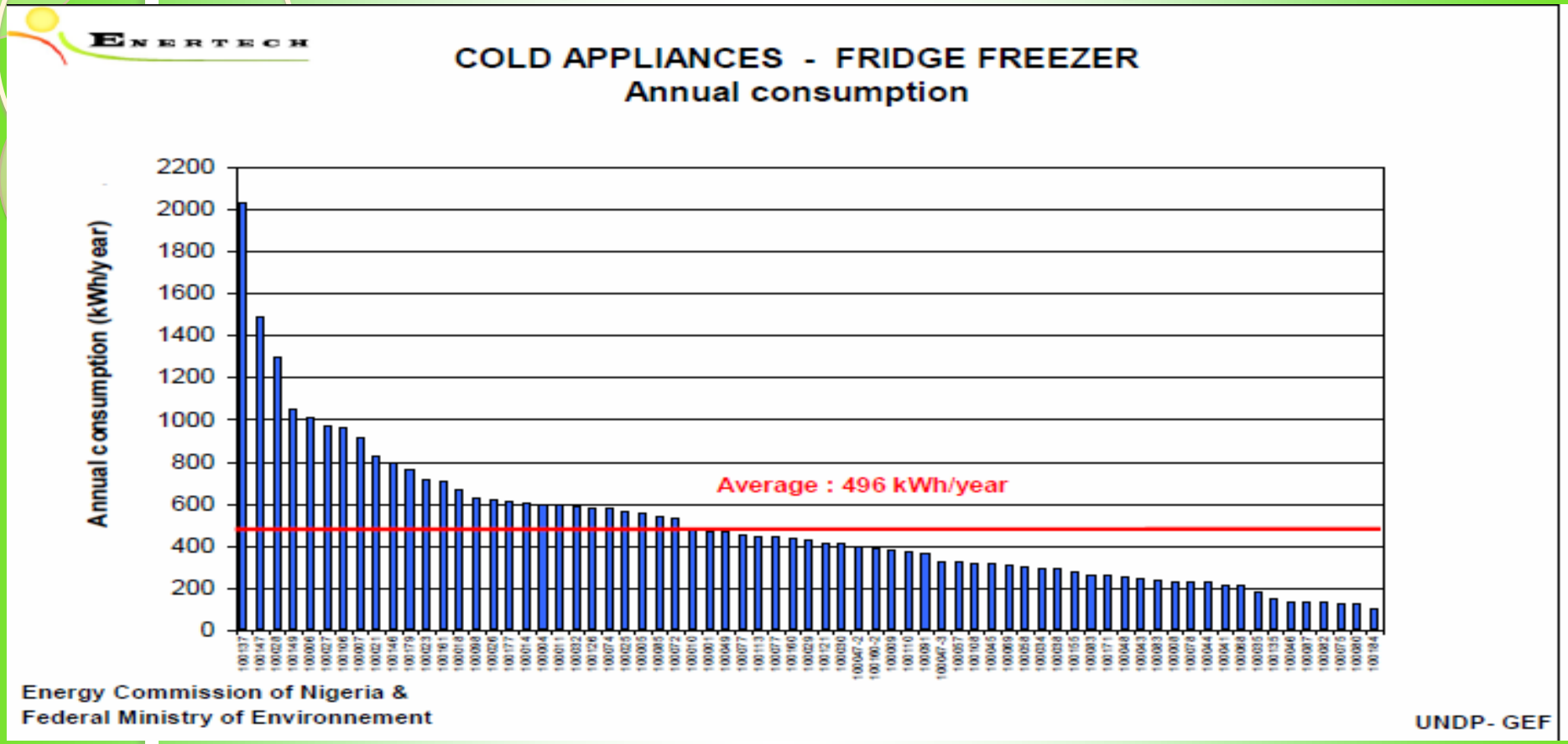
- The consumptions per household was from less than **30 kWh/year to 1650 kWh/year. The average value of 635 kWh/year**

Functioning rates during the power access



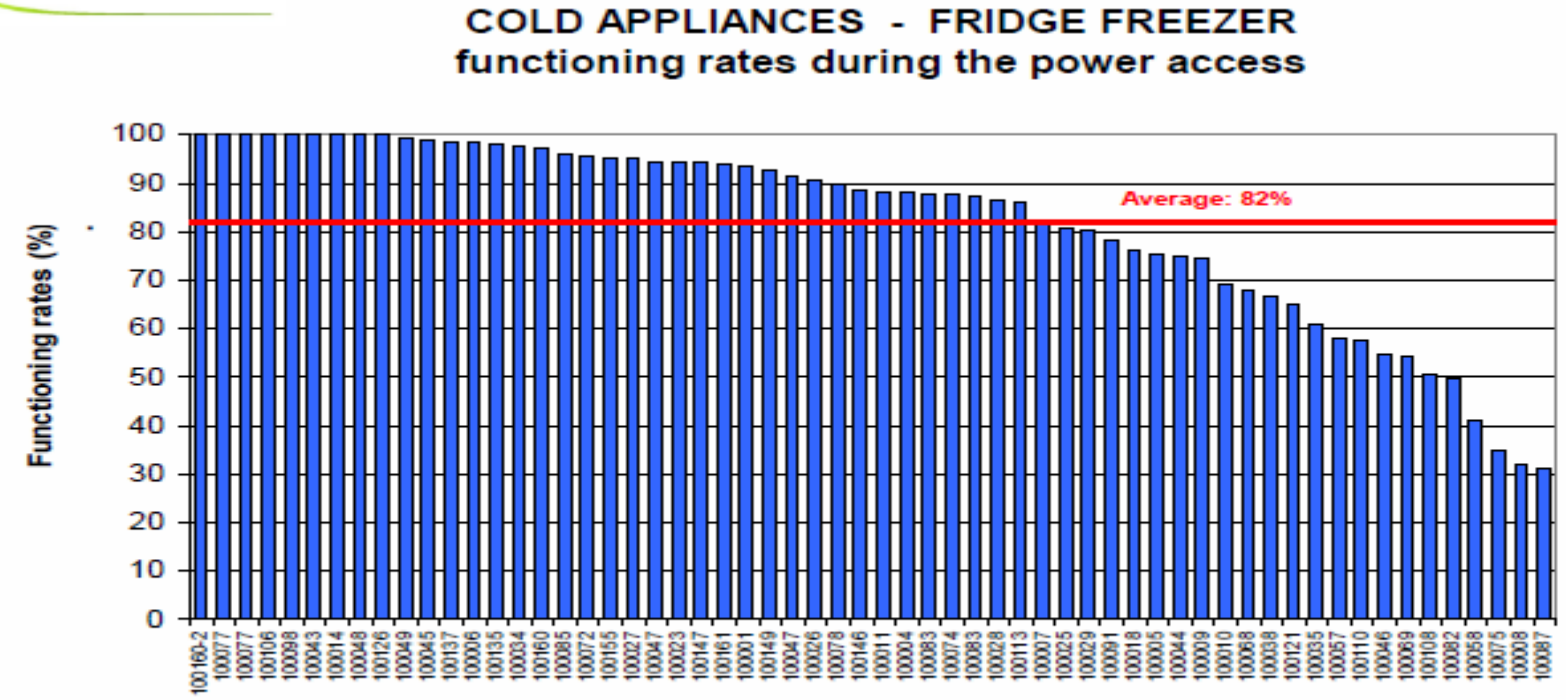
- **Figure shows the functioning rate when power is available. The values goes from 28 to 100% and the average value of 78% is very high for that type of equipment.**
- **This is explained by the frequent power outage that leads to very long compressor cycles.**

Annual consumption for the fridge-freezers



- The consumptions per household goes from less than **100 kWh/year to 2000 kWh/year with average value of 496 kWh/year**

Functional Rate When is Available



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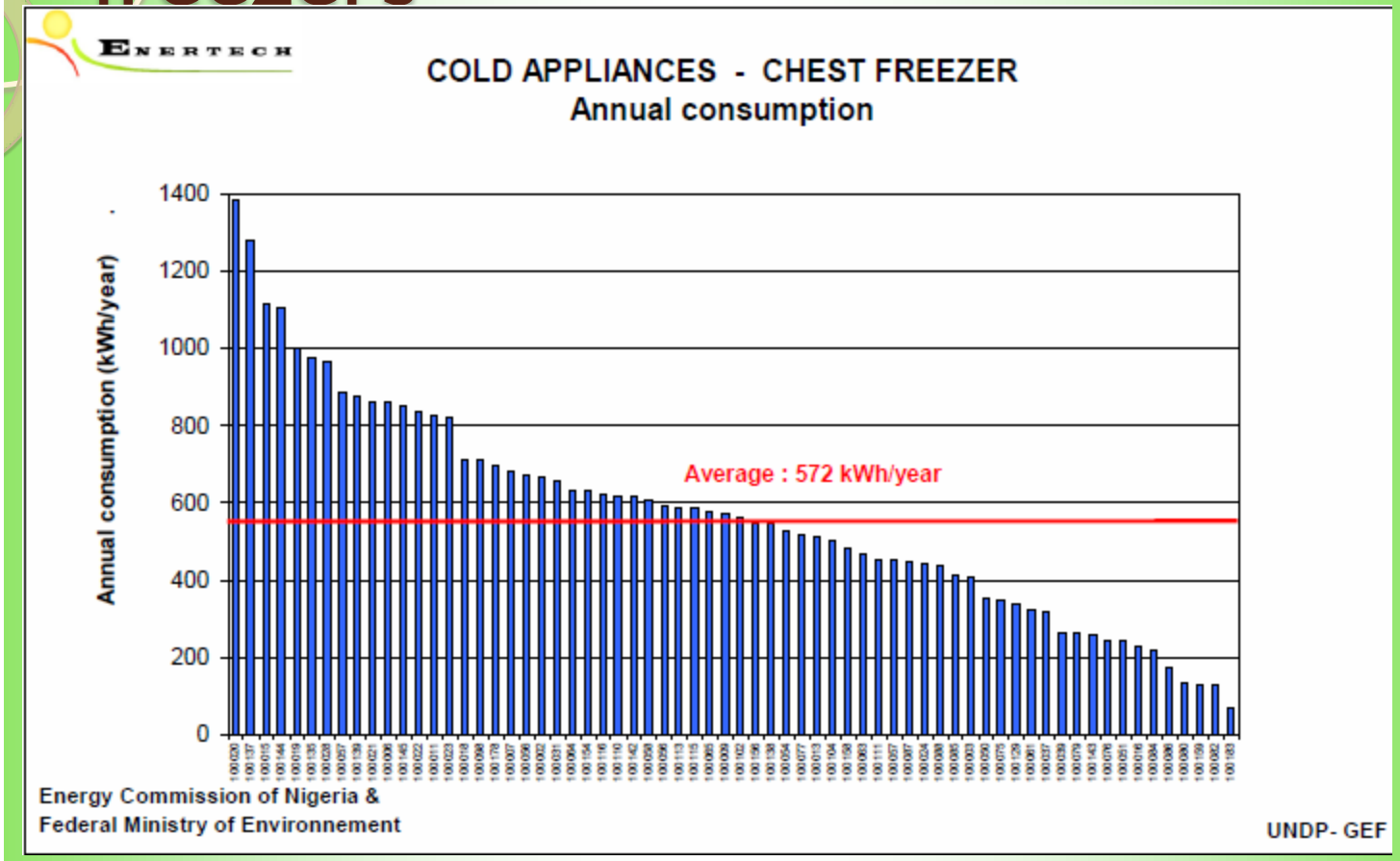
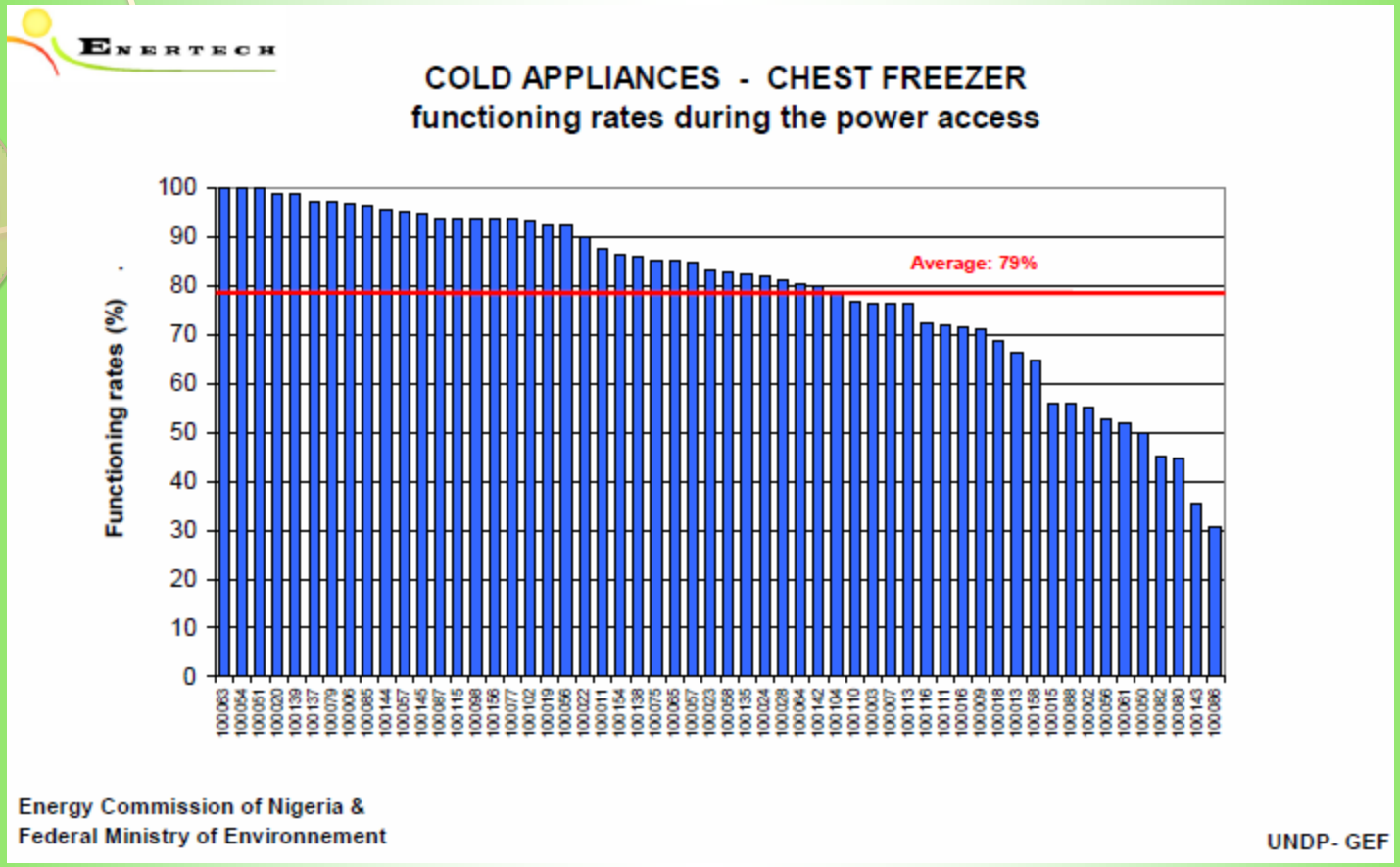
- **The Figure shows the functioning rate during the power access. The values goes from 31 to 100% and the average value of 82% is very high for that type of equipment.**
- **This is explained by the frequent power outage that leads to very long compressor cycles.**

Annual consumption for the chest-freezers



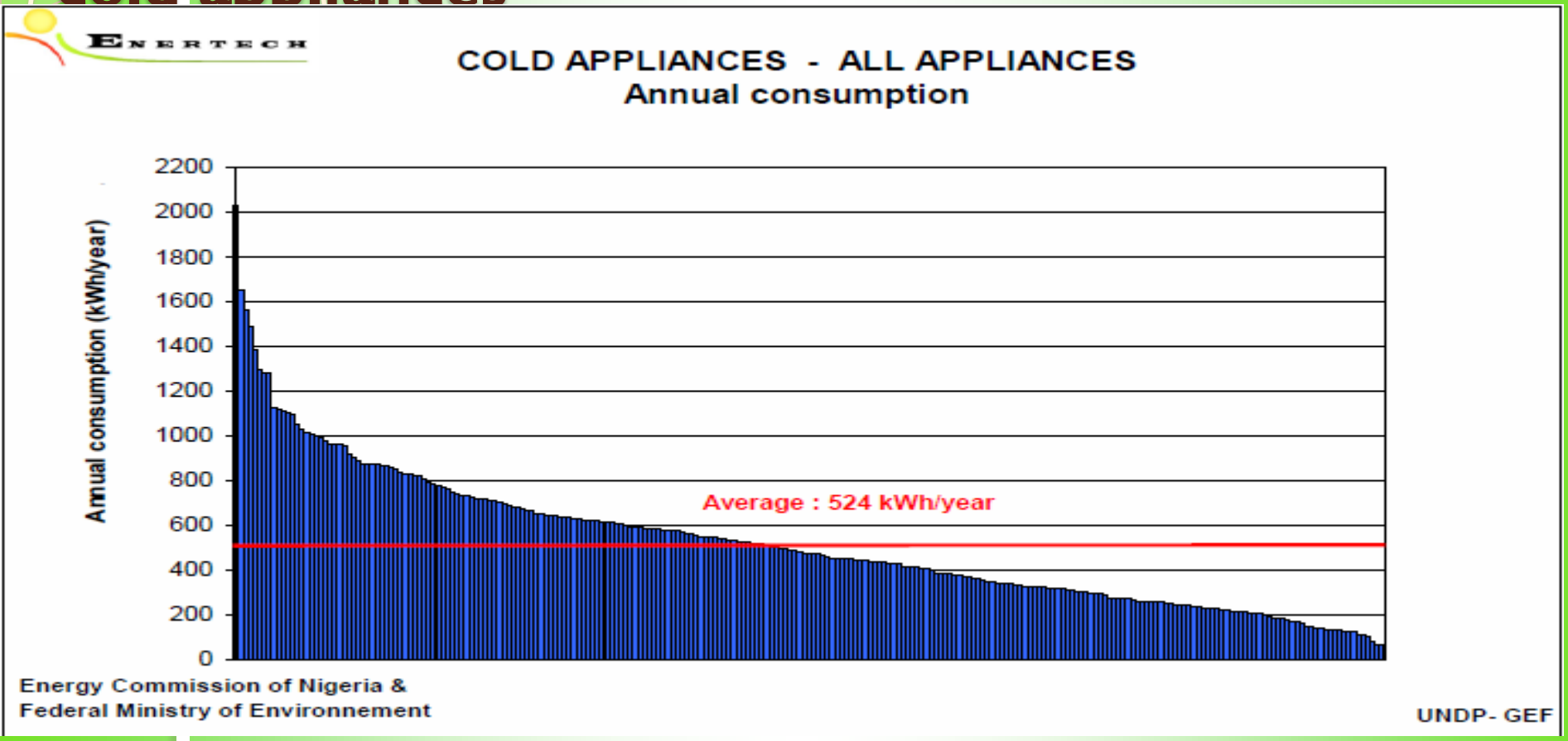
- The consumptions per household goes from less than **75 kWh/year to 1400 kWh/year. The average value of 572 kWh/year**

Functioning rates during the power access



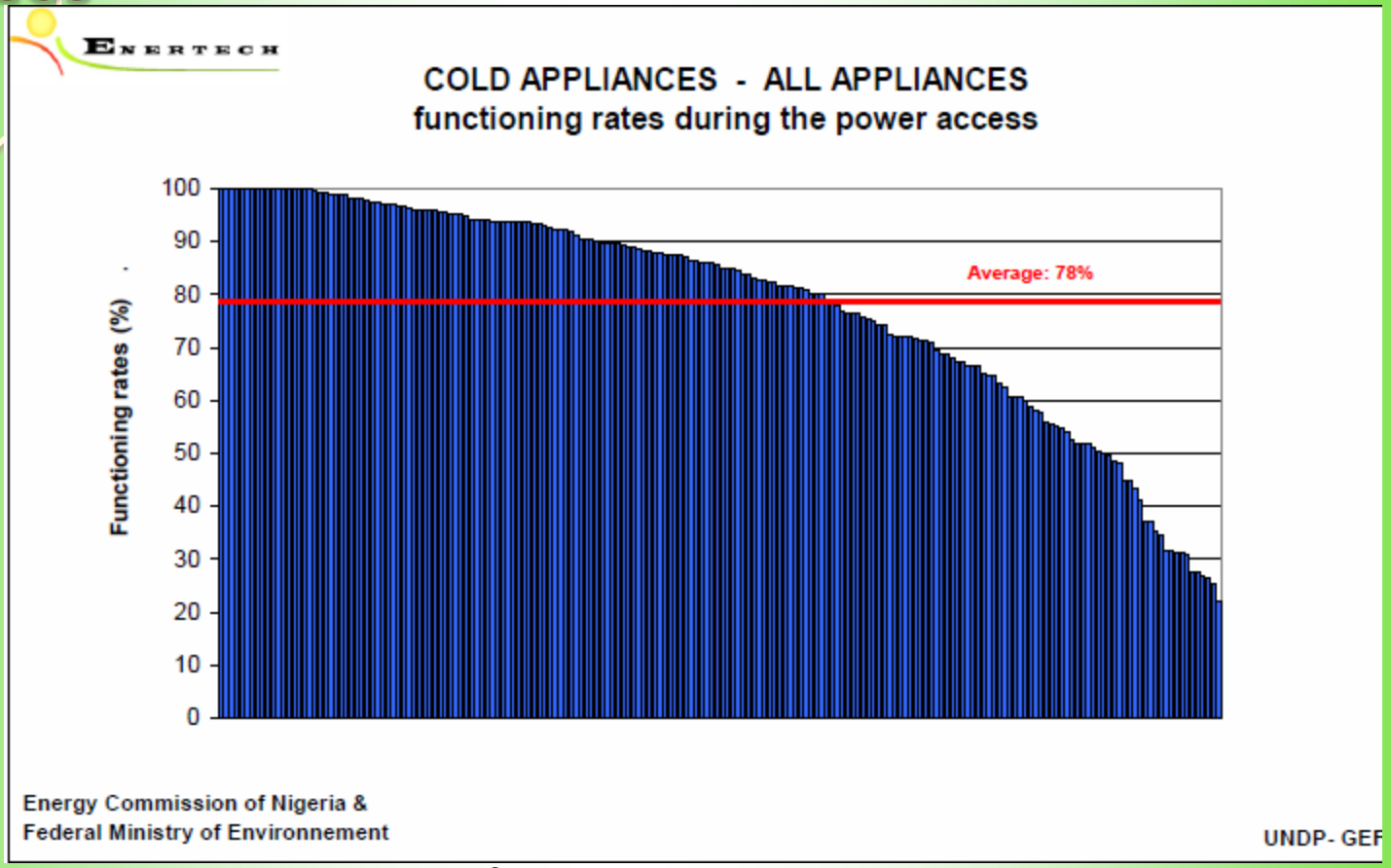
- Figure shows the functioning rate during the power access.T
- he values goes from 30 to 100% and the average value of 79% is very high for that type of equipment.
- This is explained by the frequent power outage that leads to very long compressor cycles.

CONCLUSION: Annual consumption for all the cold appliances



- The Figure shows the annual consumption for all the cold appliances.
- The individual annual consumptions were aggregated per household.
- The consumptions goes from less than **30 kWh/year to 2000 kWh/year with an average value at 524 kWh/year .**

CONCLUSION: Functioning Rate for all cold appliances



- The Figure shows the functioning rate during the power access.
- The values goes from 20 to 100% and the average value of 78% is very high for that type of equipment.
- This is explained by the frequent power outage that leads to very long compressor cycles.

CONCLUSION: Lists of all the results for the cold appliances from the previous Slides

	COLD APPLIANCES	FRIDGE	FREEZER	FRIDGE FREEZER	CHEST FREEZER
Average number of appliances per Households	1,37	0,28	0,2	0,38	0,44
Annualized consumption	524kWh/y	425kWh/y	635kWh/y	496kWh/y	572kWh/y
Fonctioning rates during the power access	78%	73%	78%	82%	79%

Thank You

AND GOD BLESS!