

Sector analysis Kenya

Energy Efficiency in the Food and Beverage Manufacturing Sector

Godfrey Marambe / Nelson Muhanji
Energy Intelligence Africa

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Facilitator

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Background

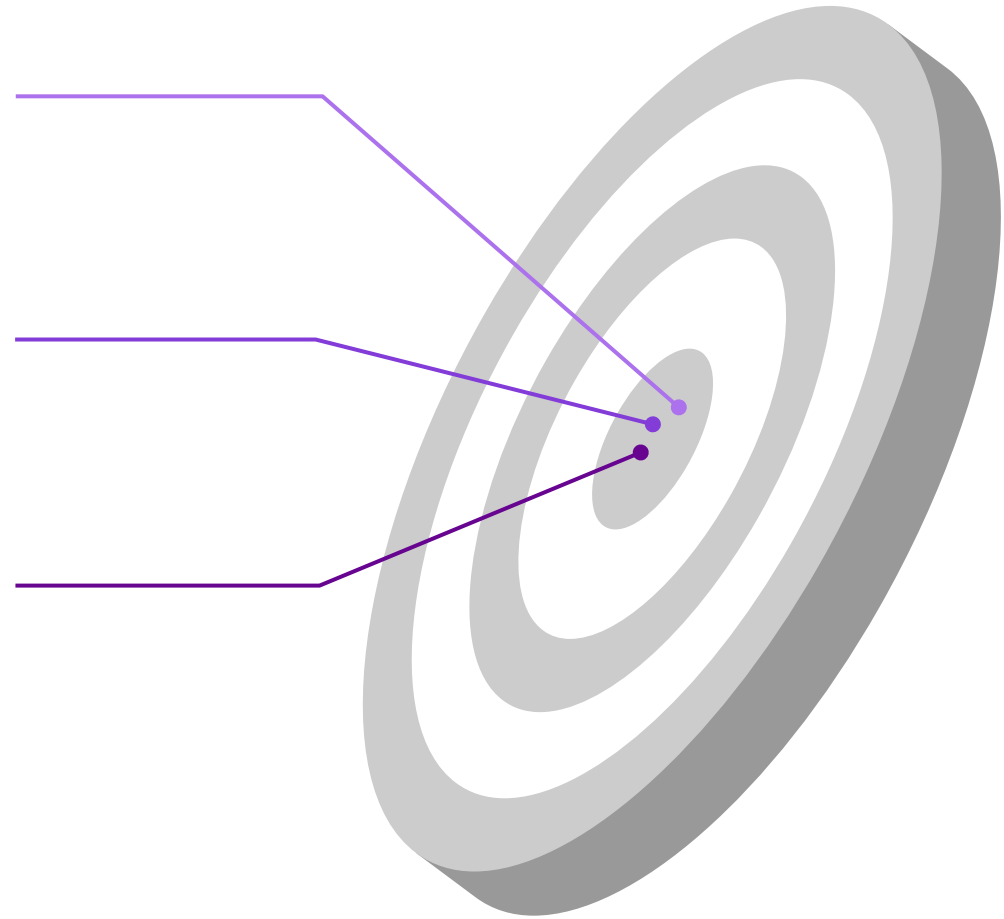
- ❑ Manufacturing sector contributed to 7.6% of Kenya's Gross Domestic Product (GDP). In terms of electricity consumption, the commercial and industrial sector accounts for approximately 52.8% (June 2021)
- ❑ Why the focus on energy efficiency?:
 - Increased efficiency can lower greenhouse gas (GHG) emissions and other pollutants, as well as decrease water use.
 - Improving energy efficiency can lower individual utility bills, create jobs, and help stabilize electricity prices and volatility.
 - Energy efficiency also helps diversify utility resource portfolios and can be a hedge against uncertainty associated with fluctuating fuel price
 - Energy efficiency can provide long-term benefits by lowering overall electricity demand

Objectives

Provide energy efficiency analysis in the F & B sector in Kenya

Analyse the development of the energy efficiency market in Kenya to date

Identify and demonstrate the potential of EE in the F & B Sector



Procedures/ Methods



Findings: Stakeholders

Key players in the Food and Beverage sectors include:

- ❑ Companies in food and beverage manufacturing (Manufacturers of F&B products)
- ❑ Energy service providers (ESCOs)
- ❑ Government and energy sector regulator (EPRA, KEBS, etc.)
- ❑ Manufacturing sector and energy sector associations (KAM)

Findings: Regulatory Framework

Policies and laws are in place that promotes energy efficiency in the manufacturing sector.

1. The Energy Act, 2019
2. Energy (Energy Management Regulations) 2012
3. Energy (Appliance Performance Standards and Labeling) Regulations 2016
4. Energy Audit Standards & Energy Performance Standards
5. The Kenya National Energy Policy 2018

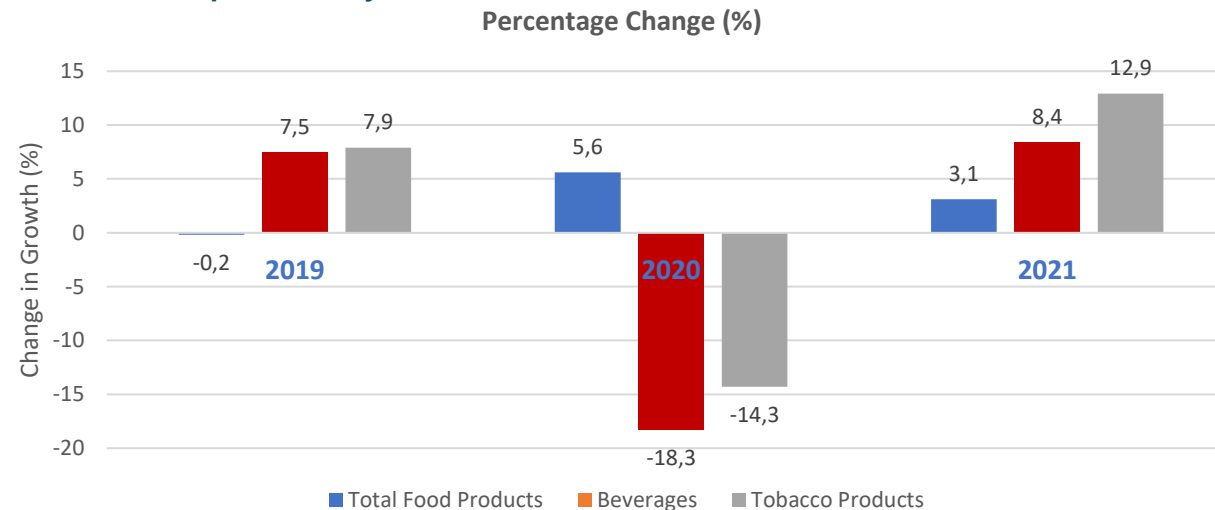
Of specific interest would be the Energy (Energy Management) Regulations 2012 which require companies consuming more than 180,000 kWh annually to conduct energy audits once in three years and implement 50% of the energy-saving measures identified before the next audit cycle.

Findings: Trends and Contributions

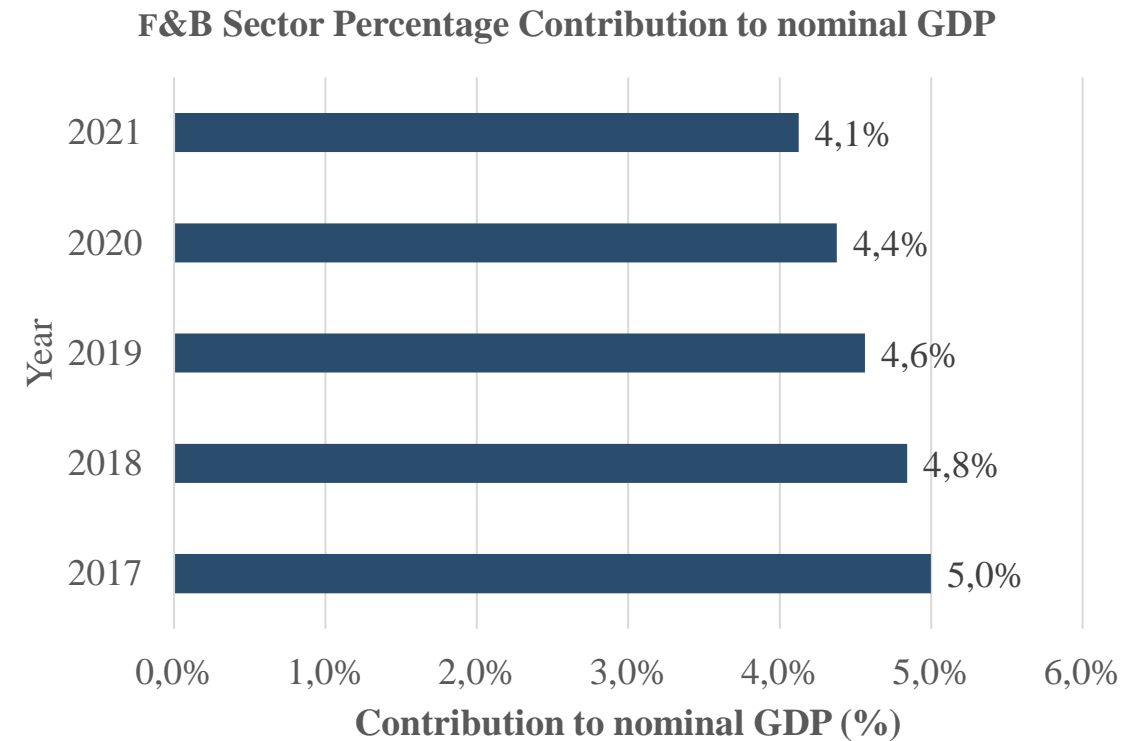
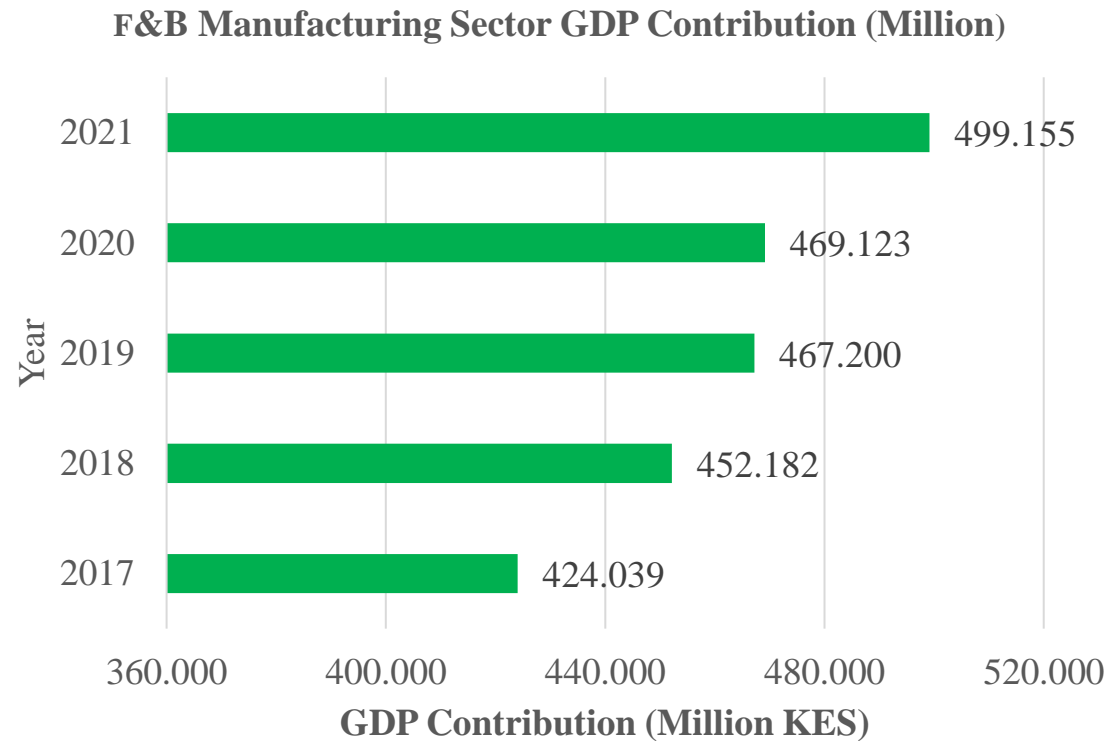
- Kenya's food and beverage manufacturing sector is the largest sector in the manufacturing industry constituting approximately 22% of KAM membership. The sector has a total of 149 registered companies that are located across the country with a huge presence in the central and western regions.
- The contribution of the food and beverage manufacturing sector to the Gross Domestic Product (GDP) increased progressively from KES 424,039 million in 2017 to KES 499,155 million in 2021.
- The percentage contribution to the nominal GDP decreased from 5% in 2017 to 4.1% in 2021 with the decrease in 2020 and 2021 partly attributed to the adverse effects of the Covid-19 pandemic that led to the slowdown of most economic activities.

Findings: Trends and Contributions

- ❑ The quantity of manufactured and processed food products increased by 3.1% in 2021 compared to a growth of 5.6% in 2020.
- ❑ The main subsectors that contributed to this growth included the processing of sugar, meat and meat products, dairy products, and bakery products, which all reported growths of 16.0%, 13.1%, 10.8%, and 9.3% respectively



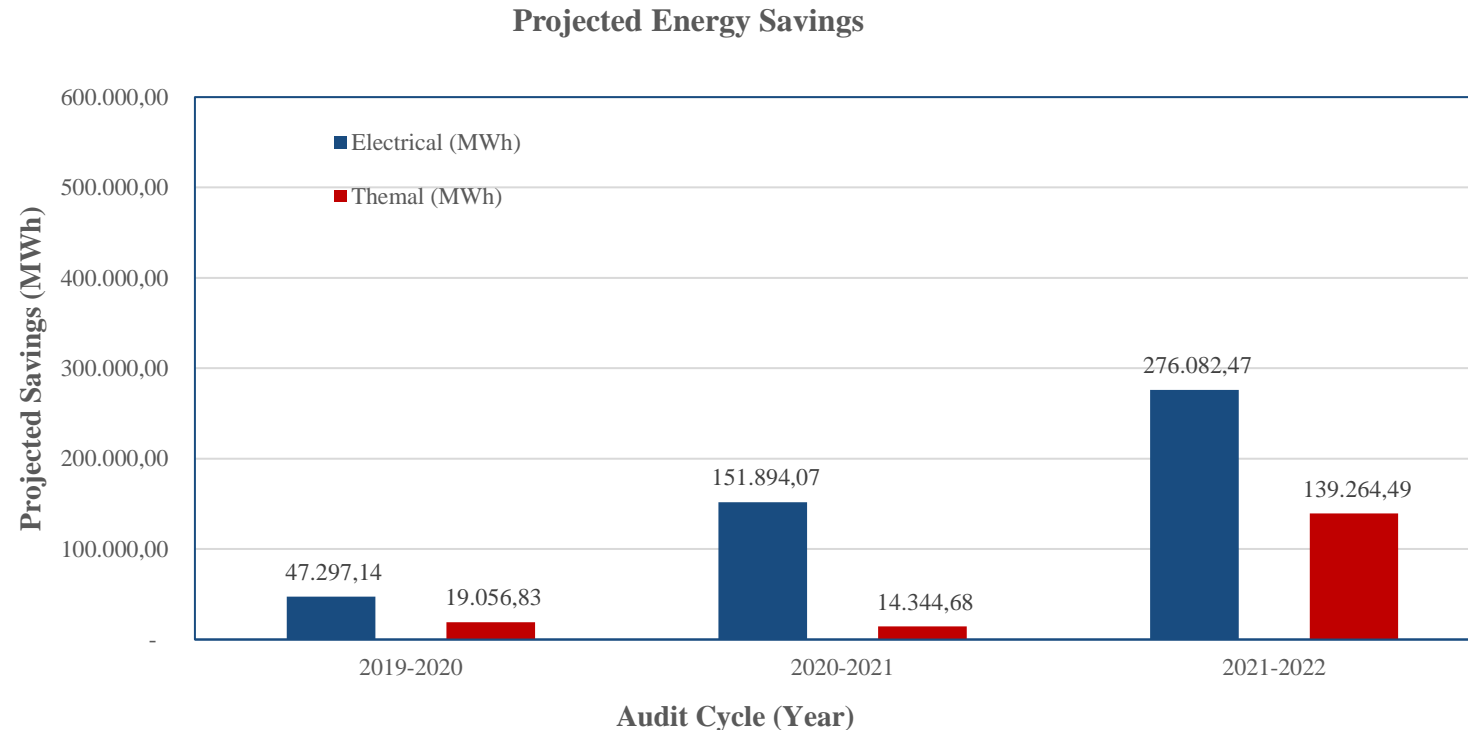
Findings: Trends and Contributions



Source: Own compilation based on KNBS economic survey

Findings- Energy Savings potential

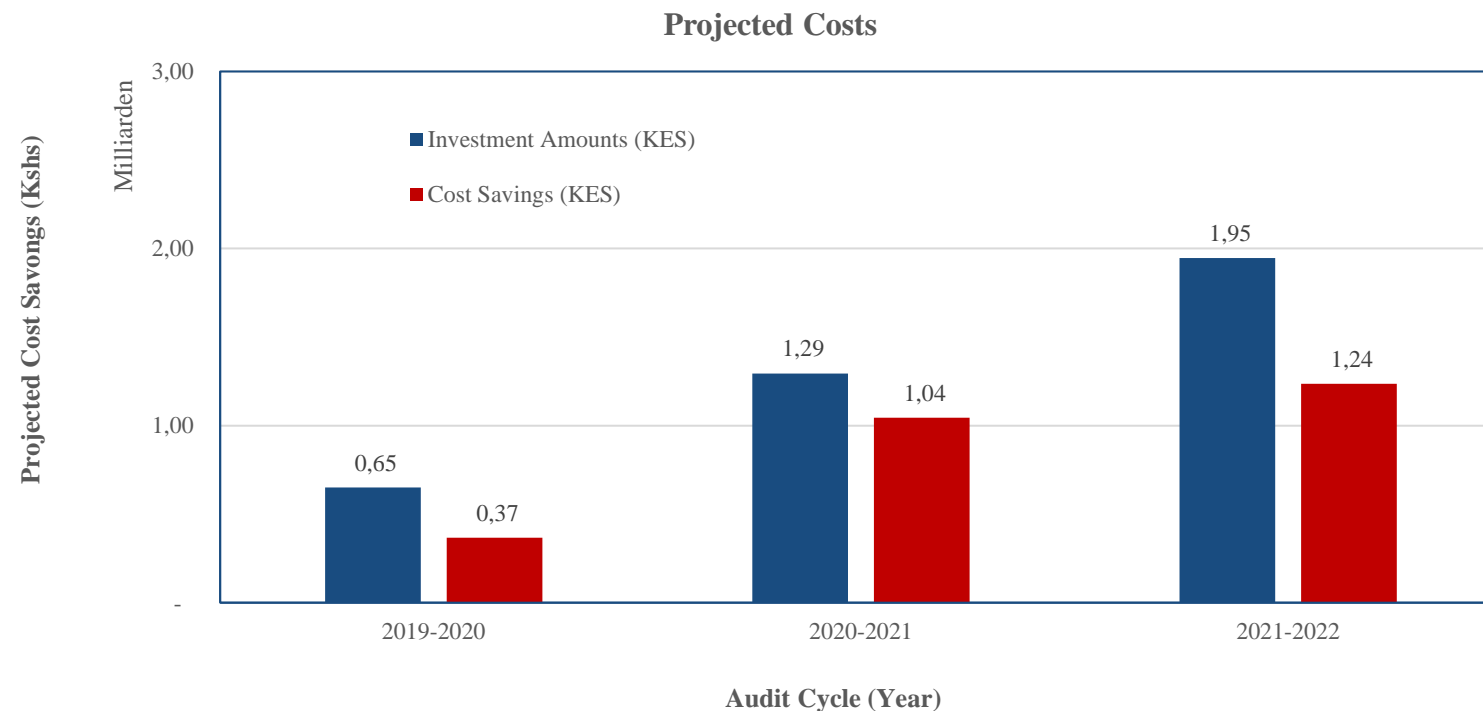
Over the past 3 years, the total projected electrical energy savings recommended from the energy audit conducted in the designated 144 facilities is about 475,274 MWh while the thermal energy savings are projected at 172,666 MWh.



Source: Own compilation based on EPRA Register of Audit Findings

Findings- Investment Projections

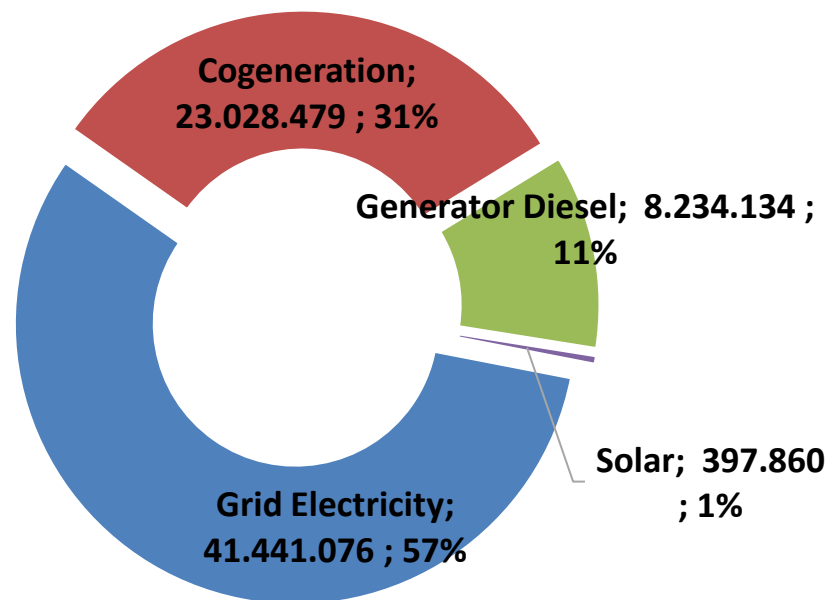
Considering the cost implication of these energy savings identified, it was observed that the high energy saving projections identified in the year 2021-2022 were projected to attract an annual investment cost of KES 1.95 billion with the projected annual energy savings of KES 1.24 billion with an average simple payback period of 1.57 years



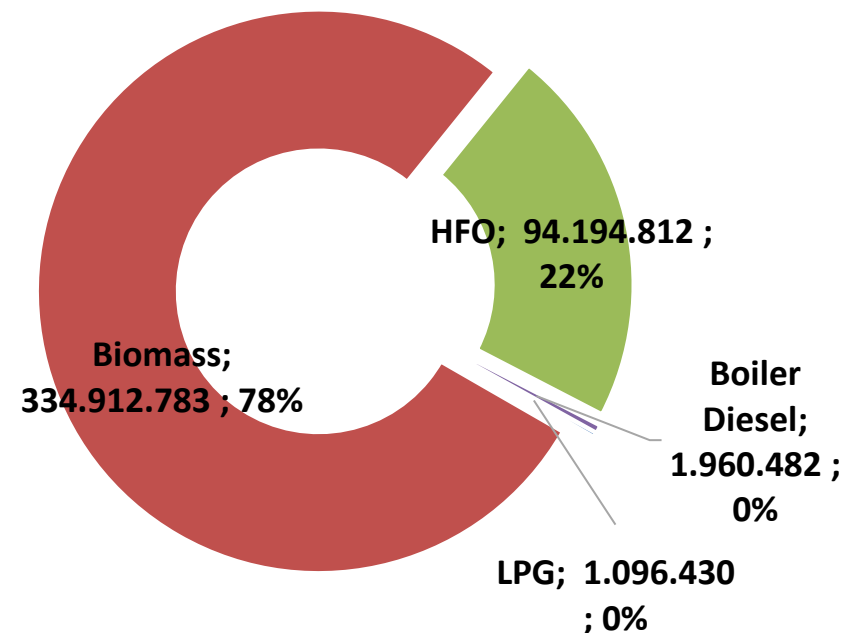
Source: Own compilation based on EPRA Register of Audit Findings

Findings- Sources of Energy

Electrical Energy Breakdown (kWh)



Thermal Energy Breakdown (kWh)



Source: Own compilation based on energy audit reports

Findings- Common Energy Consuming Equipment

- Motors & drives
- HVAC Systems
- Lighting systems
- Cooling towers
- Chillers & Cold Storages
- Compressed air systems
- Boiler and Steam Systems
- Office appliances

Findings- Common Energy Consuming Equipment Age

Device	Typical Age	Common Brands
Motors	Most of the facilities have over 50+ motors installed, with the typical age of installed devices being 3 years, while the old motors have 15+ years of age. The common type of motors is standard efficiency ones, with a few facilities having high-efficiency motors. Premium efficiency motors are not common.	ABB, Schneider, Gamak, and Saer, Kirloskar, Siemens, Bonfiglioli
Lighting	Typical facilities have 100+ installed appliances with the newest appliances being <1 year while the oldest are 5+ years in age.	OSRAM, Philips, Tronic and DP light.
Air Compressors	The number of compressors installed in the facilities ranges from 2- 8 depending on the process of compressed air demand. The common age of the devices is about 6-10 years but some facilities reported to be having devices of 15+ years.	Atlas Copco, Kaiser, Elgi, and Ingersoll Rand, Kirloskar, Kaishan, Mannesman

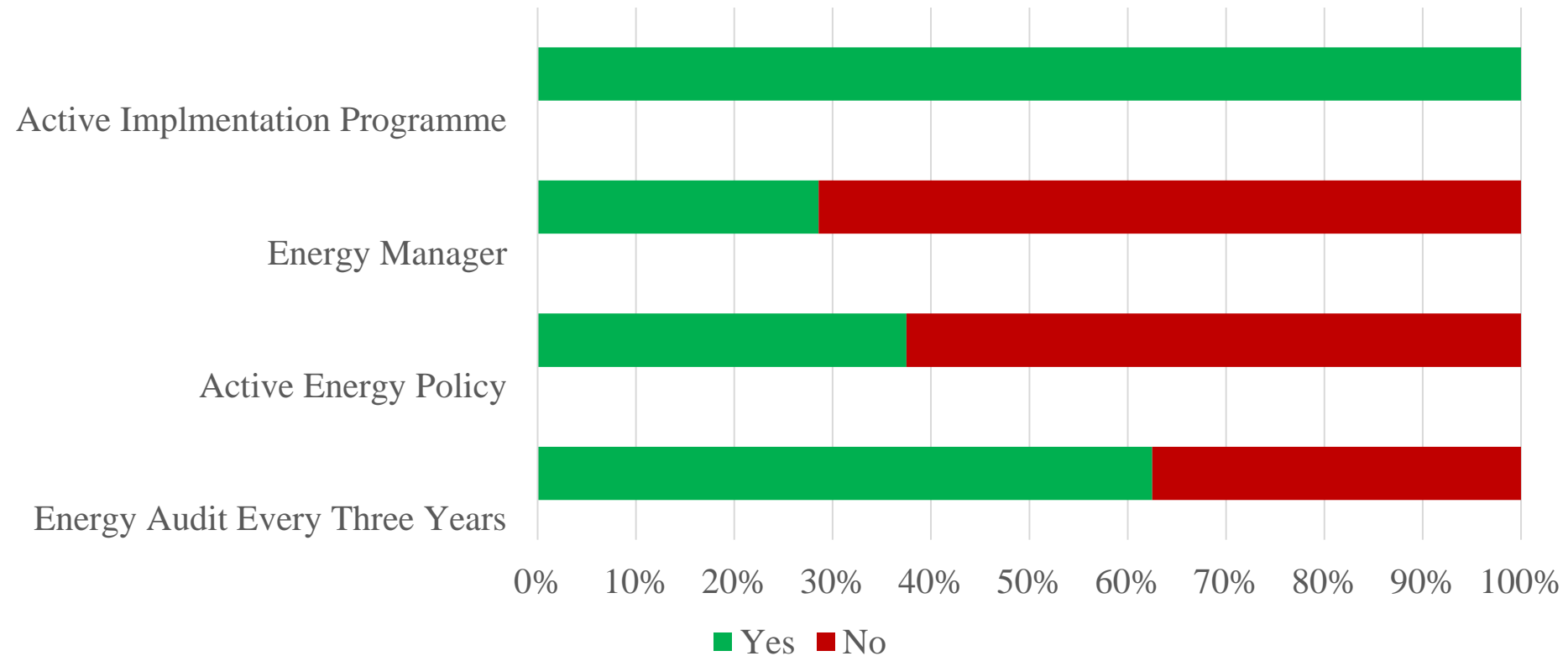
Findings: Common Energy Consuming Equipment Age

Air conditioning Systems	<p>The number of installed appliances depends on the location, the number of appliances ranges from 0-50+, with the most common age of the appliances being 6-10 years. The common type is single split AC systems. Only a few appliances have the EPRA energy performance label.</p>	<p>Samsung, VON, Gree, Carrier, DAIKIN, Toshiba, Trane, Midea LG, Armco, Bosch, Sharp, Hisense, and Siemens</p>
Cooling Towers	<p>The most common number of cooling towers per facility was 2-4 with most of the cooling towers being 11-15 years old.</p>	
Chillers	<p>The most common number of appliances ranges between 3-5, with the most commonly reported age of the appliance being 0-5 years, although some facilities reported devices with ages ranging between 11-15 years.</p>	<p>KKT Chillers</p>

Findings- Common Energy Consuming Equipment Age

Boilers and Steam distribution Systems	The most common number of installed devices in the facilities is 1-2 with the age of the common age of devices being 0-5 years.	John Thompsons, Bosch, Shellmax, Forbes Marshall
Cold Storages	Facilities reporting having cold storage had 5+ cold storages, and the most common age of the cold storages was reported to be <10 years.	Gutner/Bitzer
Pumps	Most facilities have over 10+ pumps with the typical age of the installed devices being 3 years while the old pumps have 15+ years of age.	Grundfos, Pedrollo, KSB, Lorentz

Findings- Commitment to EMR 2012



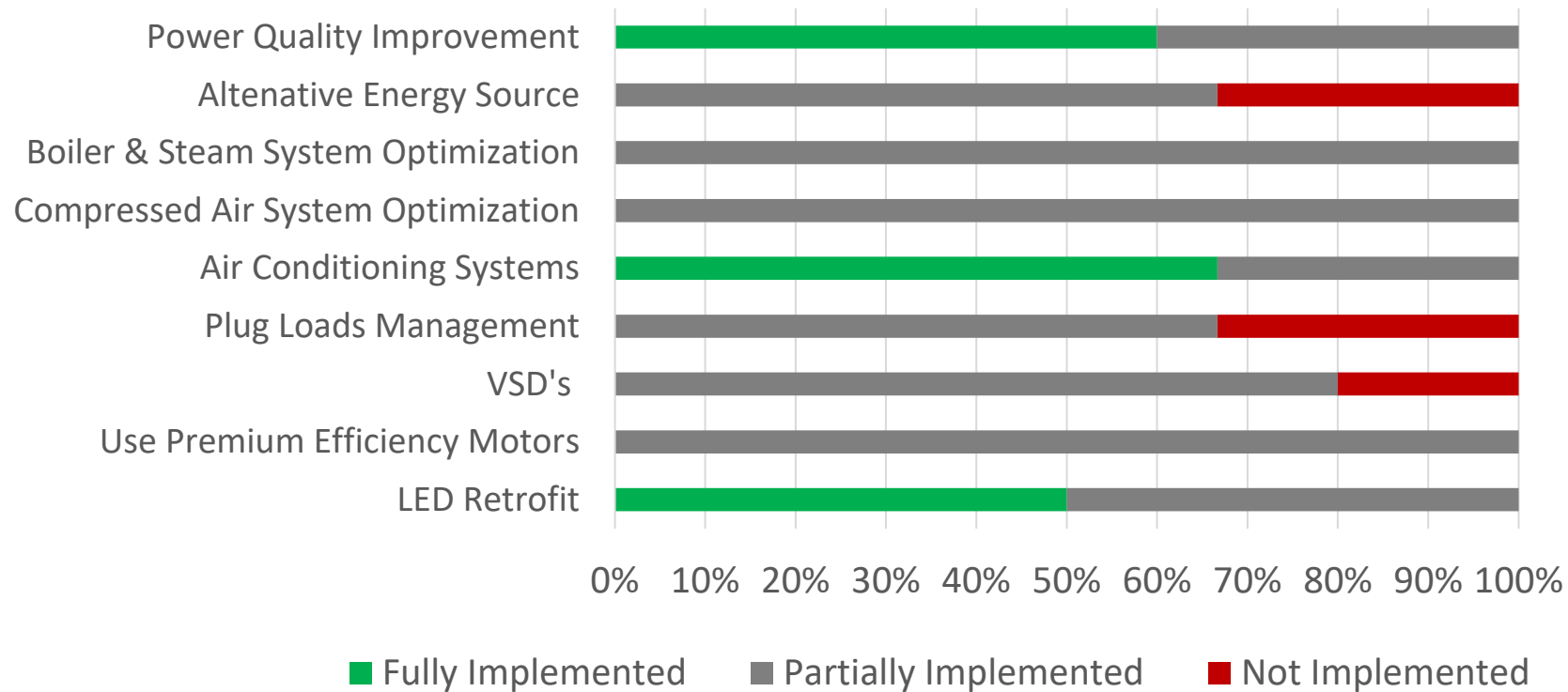
Source: Own compilation based on site visit data

Findings- Audits realized in Sampled facilities

Energy Audit Realized	
Type of Audit	% of Facilities Conducted
Energy Audit- General Grade	88%
Energy Audit- Investment Grade	43%
Waste Management Audit	50%
Water Quality Audit	50%
Electrical Safety Audit	50%
Fire Safety Audit	100%

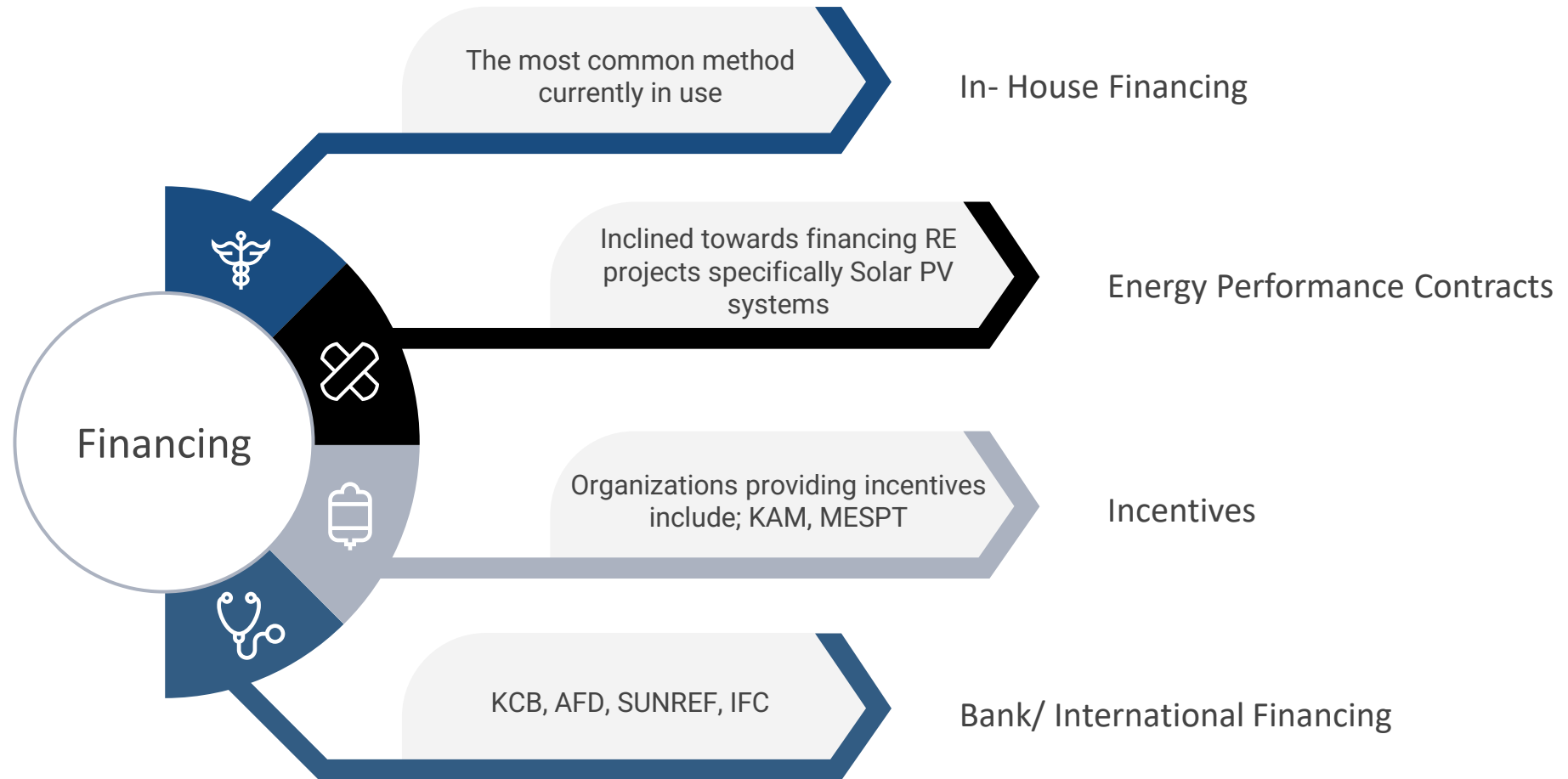
Source: Own compilation based on site visit data

Findings: Audit Recommendation Implementation Levels

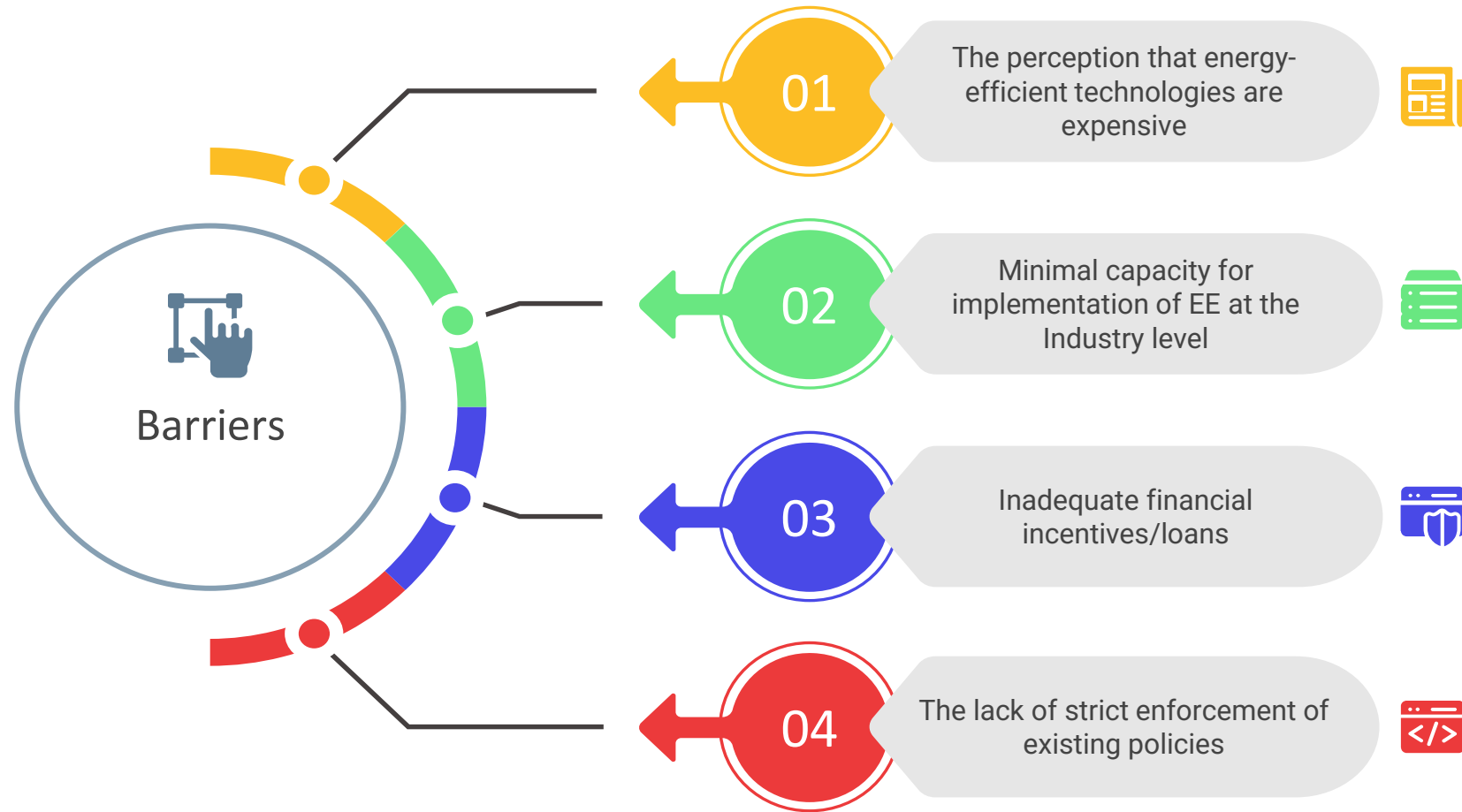


Source: Own compilation based on site visit data

Findings: Financing Mechanisms



Findings: Barriers to Implementation of EE Measures



Findings: Further Steps needed to actualize Energy Efficiency in the Sector

- Formulation of implementation plans; most of the recommendations made in the energy audits reports are left lying on the shelves without proper planning on how and when to implement them.
- Financial partnership; limited finances form a basis on which all the facilities that were visited have failed to implement all of the energy efficiency recommendations proposed to them.
- Capacity building and sensitization; the sector needs to invest in training of the staff in energy efficiency-related aspects to create a synergy of purpose towards achieving optimization in the operations.

Market Opportunities

- Provision of energy audit services.
- Supply, distribution and retail of energy efficiency technologies in the market.
- Installation services for energy efficiency technologies, as well as green energy technologies.
- Provision of financing for energy efficiency projects.
- Training and capacity building of staff on energy efficiency in the sector.

Conclusion and Recommendations: Main Barriers to Entry

- **Government policies:** Whereas foreign investment is actively encouraged in all sectors of the economy, there are some requirements that a foreign operator has to meet before gaining access to the Kenyan market, especially in the energy field.
- **Customer Loyalty:** Most of the players in the market currently rely on already existing service providers to get solutions in the energy sector.

Conclusion and Recommendations: How to overcome said barriers

- Good understanding of the policy requirement for business establishment, and running the business as well as licensing requirements.
- Focus on implementation of the identified energy-saving measures and the provision of financing for the measures since demand is higher in these areas compared to other areas of service provision
- Good understanding of the existing technology market prices, and financial situation of the individual local manufacturing companies and provide a financial package that is well within the affordability of the companies. This could be actualized through the use of financial contracts which could be spread out within a given period of time.
- Collaboration with local business entities is highly recommended to provide an understanding of the business dynamics in the country and the complementing of services offered.

Thank You!!