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SOCIO-ECONOMIC IMPLICATION OF COOKING ENERGY TYPES AND PREFERENCE ON RURAL AND URBAN DWELLERS IN KARU LGA OF NASARAWA STATE

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ABSTRACT

Over dependence on firewood, agricultural residues and charcoal by low-income households in developing countries pose severe risks to human health, environmental sustainability and socio-economic development. Hence, this examines the socio-economic implication of cooking energy types and preference on rural and urban dwellers in Karu Local Government Area. A sample size of 400 was used for this study. Stratified, systematic and simple random sampling techniques were used in data collection. Frequency, percentages and Pearson product moment correlation analysis were used to analyse the date. The study revealed that sources of cooking energy available to households in the study area were firewood charcoal, and crop residue, for rural communities while in urban communities, it was Gas/LPG, charcoal, and electricity. The result shows a significant variation between cooking energy types used by rural and urban dwellers (F=2.285, df=0.005, P=0.026). The study concludes that firewood dominates the rural households' cooking energy preference while Gas/LPG dominates the urban households cooking energy preference. The findings underscore the critical role of socio-economic factors in determining cooking energy preferences in both rural and urban households in the study area. Stakeholders should focus on encouraging the transition to more sustainable energy solutions; this will require targeted interventions, including subsidies, infrastructure development, and educational campaigns to raise awareness about the benefits of cleaner cooking technologies.

Keywords: *Cooking Energy, Rural Dwellers, Socio-economic Implication and Urban Dwellers*

1. INTRODUCTION

Energy is essential to both rural and urban dwellers in any society as it is useful for all human activities. This, indeed, makes it critical to social and economic development. The cooking energy use patterns of urban households may differ to that of the rural households since they have different geographical characteristics. This may have permitted the cooking energy types and preference among the different households. Access to modern or clean energy is assumed to be a precondition for poverty alleviation, and sustainable development goals (SDGs). Cooking energy sources range from the traditional biomass (fuel wood and charcoal) to modern or clean energy types like Liquefied Petroleum Gas (LPG) and electricity. Access to energy is a crucial component for development, as it is a determinant of livelihood status at the household level

(Karmaker, et al., 2022) and has backward effects on the household's economic status (Rahut, Ali, Mottaleb, & Aryal, 2020). It is generally recognized that energy, including electricity, plays a significant role in the economic development of a country as it enhances the productivity of the nation when inputs such as capital and labor are considered. In addition, the increased consumption is an indication of increase in economic activities, and by inference, an improvement in economic development of energy signifies that a country has high economic ranking. The household cooking sector is the largest consumer of energy in Nigeria, using around 80% of the total, 90% of which is derived from biomass, particularly fuel wood (International Energy Agency, 2014).

The United Nations (UN) adopted the 2030 Agenda for sustainable development, which formed the bedrock for the 17 Sustainable Development Goals (SDGs) and 230 indicators in 2015. According to the UN (2018), the SDGs along with their respective indicators are considered as a product of society produced through cooperation and common desires to achieve a balance between human development and environmental protection. Among the SDGs, Goal 7 highlights the importance of access to Affordable, Reliable, Sustainable and Modern energy for all. The target associated with this goal is SDG indicator 7.1.2 ‘Access to clean fuels for cooking' which is the proportion of population with primary reliance on clean fuels and technology. This is measured as the share of the total population with access to clean fuels and technologies for cooking such as clean cookstoves reduce exposure to indoor air pollutants, a leading cause of death in low income households.

However, about 3.0 billion people worldwide have no access to clean cooking energy, while 1.3 billion people lack access to electricity, and 2.7 billion people depend on solid energy sources such as firewood and biomass for cooking and heating, which have adverse effects on human health and the natural environment (Aziz, Barua, & Chowdhury, 2022; Pangaribowo, & Iskandar, 2022). The household sector accounts for about 64 percent of energy consumption in Nigeria with energy consuming activities such as cooking, lighting and use of electrical appliances but, cooking averagely account for about 71 percent out of the 64 percent of the total energy consumed in the household (Energy Commission of Nigeria [ECN], 2012) (Energy Commission of Nigeria, 2012). Likewise, 65 percent of households' cooking is done mainly with home-made traditional stoves or open fires (Kulla, Suleiman, and Ishaya 2012); and these stoves are fired by various forms of biomass fuels such as firewood, animal residue, charcoal, and saw dust, as against the 35 percent that uses the conventional energy like kerosene, liquefied petroleum gas (LPG), and electricity (Yakubu 2014).
The free availability of these fuels from nature makes them the primary fuel source for households' cooking purpose. In Nigeria, Household air pollution from inefficient burning of solid fuels is estimated to cause over 95,000 premature deaths annually (Ozoh, et al., 2020). The dependence on traditional energy fuels for cooking increases energy-related pollution at the household level, which are harmful to human existence, and somehow contribute to environmental degradation. Women and young children face the highest risk due to their high exposure levels while cooking (Ibikunle, Asongu, Ozorchen, & Urama, 2023). The burden of collecting firewood tends to fall more heavily on women and children who trek several kilometers and also imposes huge time burdens, limiting economic opportunities (Maina, Hyseni, Yaro, & Mahmoud, 2021; Maina et al., 2021, Edomah, 2022).

The cooking energy patterns of urban households may differ to that of the rural households since they have different geographical characteristics. Availability of clean, modern and affordable cooking energy consumption both in the rural and urban areas is of great concern. It is based on this background that this study sought to investigate the socio-economic implication of cooking energy types and preference on rural and urban dwellers in Karu LGA, Nassrawa State.

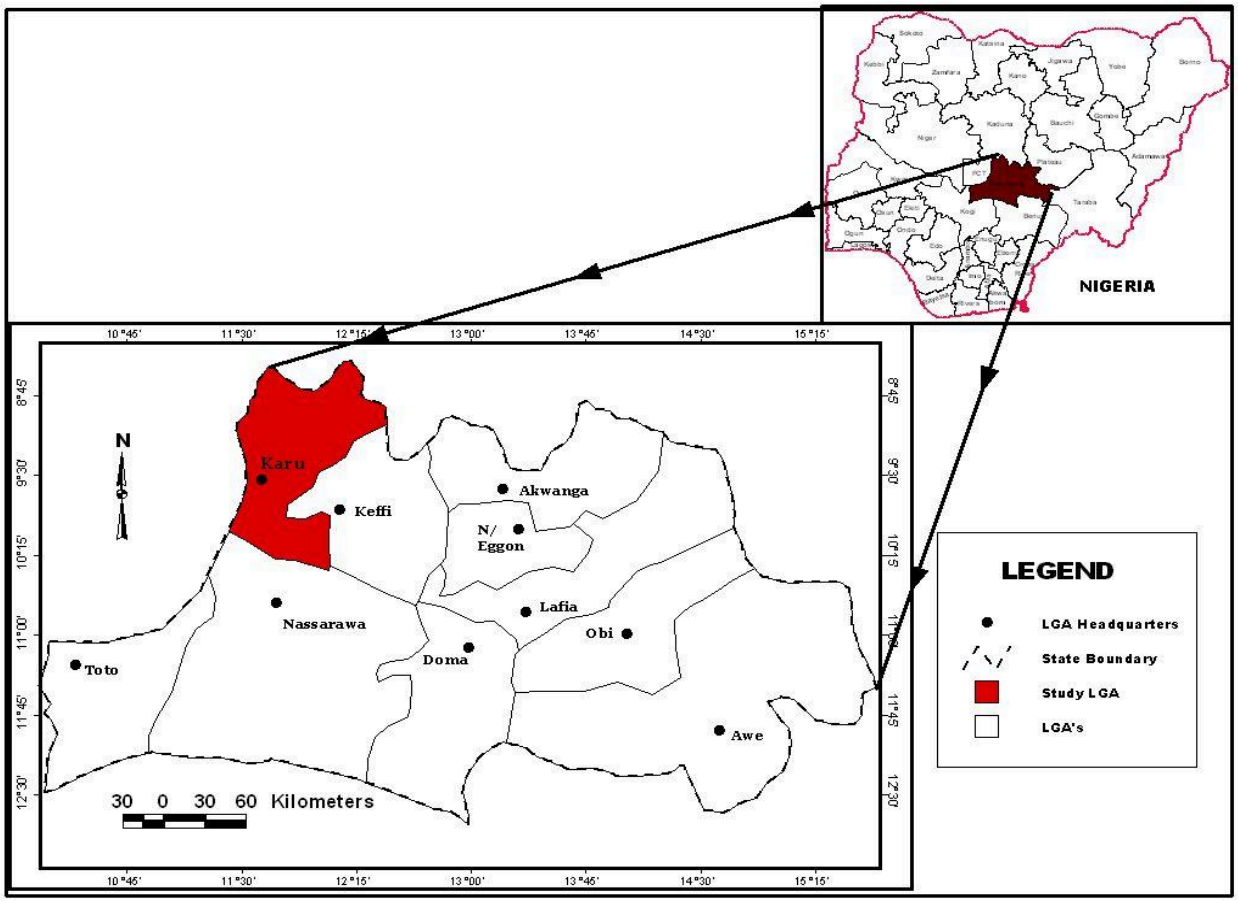

Figure 1: Nasarawa State showing Karu LGA
Source: Monitoring Environmental Sanitation in Greater Karu Urban Area (2023)

2. MATERIALS AND METHODS

The study area has two seasons: the wet and the dry season. The wet season extends from April to October, and the dry season occurs during the Harmattan period, which is characterized by dry and dusty blowing from the Sahara Desert from November to Marchn Figure 1. Karu Local Government Area, is found in north-Central Nigeria, is located within the Northern Tropical Region. The study area is on Latitude 8°59'46'N and 7° 34' 32"E and Longitude 90°25'N and 80°00"E. The wet season starts from May and ends in October, the dry seasons starts from November to April. The vegetation of the study area is the Guinea savannah (Aboki, Mailafiya, Osaba, 2007).

The study used both secondary and primary sources of data. The secondary source of data includes relevant information from publications such as journals, bulletins, past thesis, past

dissertations, seminar and conference papers, publications from the internet published books while the primary data used data collected from the field. The population data was obtained from the National Bureau of Statistics (NBS) 2014 to estimate the population of persons living in Karu Local Government Area of Nasarawa State, while National Population Commission (NPC) data was used to project the estimated persons living in the selected communities in the study area Table 1. The projected population cuts across all occupational boundaries, irrespective of income, status, and educational background. The study used a descriptive survey design to assess cooking energy consumption among the urban and rural households in Karu Local Government Area of Nasarawa State. The study design used a questionnaire for data collection. This study adopted a quantitative method of data analysis, which includes One-way Analysis of variance (ANOVA) using SPSS version 20.0, Descriptive statistics of frequency, percentage, standard deviation and mean and content analysis.

Table 1: Sample Distribution

S/N	District	Communities Selected	2014 Population	2024 Projected Population	Number of Households Selected
1.	Karu	Mararaba-Guruku	15,342	125,112	136
		Masaka	10,422	84,989	92
2.	Karshi	Karshi	4,784	39,013	42
		Piyanku	5,116	41,720	46
3.	Panda	Akwag	1,312	10,699	12
		Oyork	1,025	8,359	9
4	Bagaji	Gunduma	4,274	34,854	38
		Bagaji	2,723	22,206	25
	Total		**44,998**	**366,952**	**400**

Source: National Population Commission and Researcher's Computation

3. RESULTS AND DISCUSSION

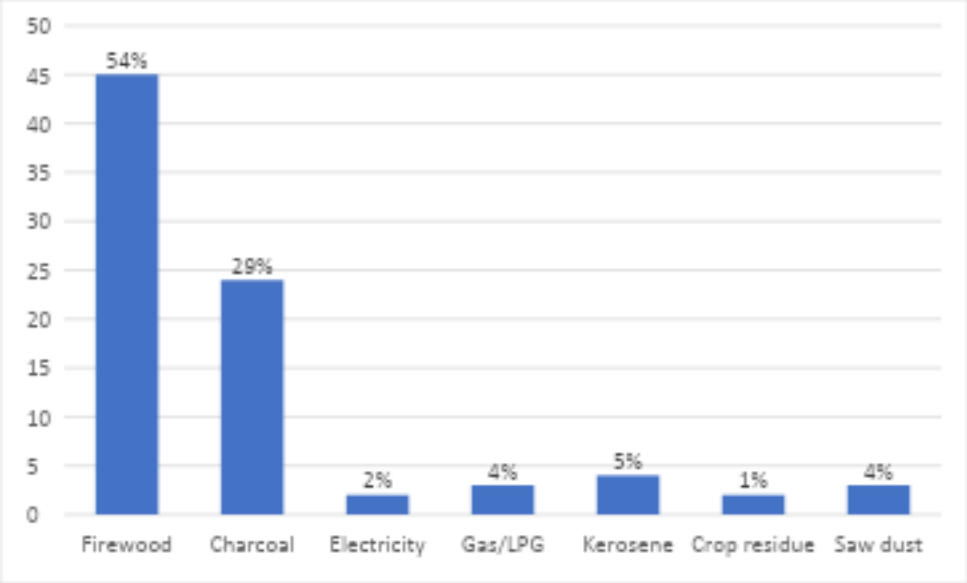

Figure 2: Preferred cooking Energy Sources in Rural Communities in the Study Area

Figure 2 shows the preferences for different types of cooking energy among rural households in the study area. More than half (54%) of the respondents preferred firewood as their primary cooking energy source. This indicates that firewood is the most commonly used fuel in rural households, this likely due to its availability and low cost, despite potential drawbacks such as health issues from smoke and environmental impact. About 29% of the respondents preferred charcoal. Charcoal is often favoured for its higher efficiency compared to firewood and its ability to produce less smoke, making it a popular choice despite its own environmental and health impacts. Mere 2% of the respondents preferred electricity for cooking. This low percentage suggests limited access to reliable electricity or the high cost of electric cooking appliances in rural areas. Only 4% of respondents preferred using Gas/LPG. Although Gas/LPG is a cleaner and more efficient energy source, its higher cost and the need for regular refilling may limit its popularity among rural households. Five percent of respondents preferred kerosene. Kerosene stoves are portable and relatively inexpensive, but the fuel can be expensive and may produce harmful emissions. About 2% of the respondents preferred using crop residue. This choice might be based on the availability of agricultural waste materials, although it may not be as efficient or clean as other fuels. Four percent of the respondents preferred saw-dust. Sawdust is typically used where wood processing is common, and it can be a cost-effective option, though it may have limitations in terms of efficiency and consistency.

Majority of rural households preferred traditional biomass fuels such as firewood and charcoal, which are widely available and relatively inexpensive but have significant health and environmental drawbacks. Modern fuels like electricity and Gas/LPG are less preferred, likely due to higher costs, accessibility issues, and infrastructural challenges. This preference pattern underscores the need for interventions that promote cleaner and more efficient cooking energy alternatives while addressing the barriers to their adoption in rural areas. These findings are in line with the results of Ampitan and Oyerinde (2015), Mannir, Abubakar and Ikwuakam (2024)

that rural households preferred traditional biomass fuels such as charcoal and firewood because of its availability and relatively inexpensive.

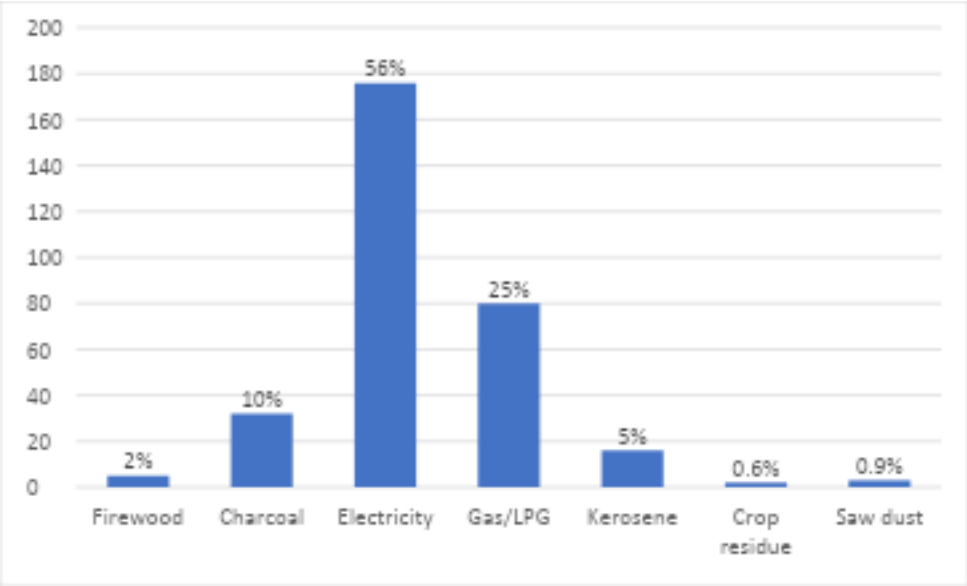

Figure 3: Preferred cooking Energy Sources in Urban Households in the Study Area

In Figure 3, it shows the current preferences for different types of cooking energy among urban households in the study area. Two percent of respondents used firewood. This low percentage indicates that firewood is not a preferred cooking energy source in urban areas, likely due to its inefficiency and the availability of better alternatives. About 10% of respondents used charcoal. Charcoal is more common than firewood but still a minority preference, likely due to its ease of use and availability compared to more modern fuels. Slightly above half (56%) of respondents used electricity. This majority preference highlights the accessibility and convenience of electricity as a cooking energy source in urban settings where infrastructure is more developed. About a quarter (25%) of respondents used Gas/LPG. This significant percentage indicates that Gas/LPG is a popular choice valued for its efficiency and cleanliness. However, 5% of respondents used kerosene. This is less preferred compared to electricity and Gas/LPG, possibly due to its cost and safety concerns. Also, 0.6% of respondents used crop residue. This very low percentage indicates that crop residue is not a common cooking fuel in urban areas which is likely due to its impracticability and lower efficiency. About 0.9% of respondents used saw dust. This indicates a very low preference for saw dust, similar to crop residue.

The results show a strong preference for modern and cleaner cooking energy sources among urban households, with electricity being the most preferred at 56%, followed by Gas/LPG at 25%. This reflects the better infrastructure and availability of these energy sources in urban areas. Traditional biomass fuels like firewood, crop residue, and saw dust are rarely used, indicating a shift towards more efficient and less polluting options. Charcoal is used by a notable minority (10%), suggesting it still holds some relevance, possibly due to its availability and affordability compared to modern fuels. Kerosene is used by 5% of households, indicating some reliance on this fuel despite its drawbacks. These preferences highlight the importance of

accessibility, convenience, and efficiency in the choice of cooking energy sources in urban settings. These findings are consistent with Ampitan and Oyerinde (2015) that urban households preferred modern and cleaner cooking energy sources.

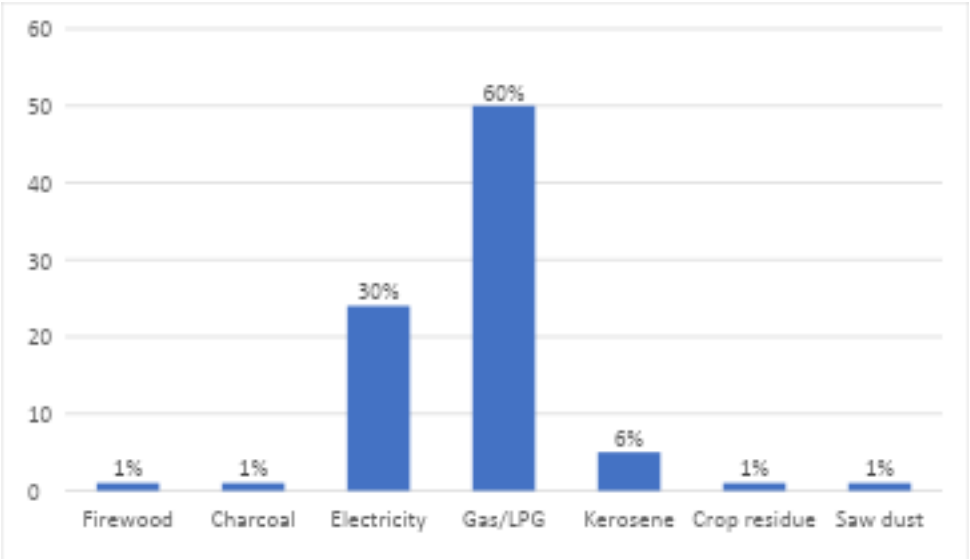

Figure 4: Preference for Cooking Energy Sources if Income increased in Rural Communities in the Study Area

Figure 4 shows the preferred types of cooking energy in rural communities if household income increased. The least (1%) of respondents would prefer firewood if their income increased. This indicates a significant shift away from traditional biomass fuels when financial constraints are lessened. Also, 1% of respondents would prefer charcoal. This further suggests a move away from fuels that are typically associated with lower income levels and more health and environmental issues. Slightly above quarter (30%) of respondents would prefer electricity. This substantial increase reflects the attractiveness of electricity as a cleaner and more convenient cooking energy source when affordability is not a primary concern. Majority (60%) of respondents would prefer Gas/LPG. This significant preference indicates that Gas/LPG is seen as a highly desirable cooking fuel, this is likely due to its efficiency, cleanliness, and ease of use. It highlights the importance of cost as a barrier to its current use. About 6% of respondents would prefer kerosene. While still a minor preference compared to Gas/LPG and electricity, it shows that some households might still opt for kerosene due to familiarity or perceived reliability. Also, 1% of respondents would prefer crop residue, suggesting that this option is generally viewed as less desirable when income allows for better alternatives. While 1% of respondents would prefer sawdust, indicating that it is not a preferred choice when more financial resources are available.

The results clearly show a dramatic shift in preferences towards modern, cleaner, and more efficient cooking energy sources like Gas/LPG and electricity if household incomes were to increase. This highlights the significant role that financial constraints play in current energy choices in rural communities. The strong preference for Gas/LPG and electricity indicates that these communities would prioritize these sources due to their benefits in terms of convenience, efficiency, and reduced health risks compared to traditional biomass fuels. These findings suggest that improving the economic conditions of rural households could lead to widespread

adoption of cleaner cooking technologies, thereby improving health outcomes and reducing environmental impact. This work conformed to the work of Desalu (2012), who studied community survey of the pattern and determinants of household sources of energy for cooking in rural and urban south western, Nigeria and that of Ampitan and Oyerinde (2015) who studied Pattern of Domestic Energy Utilization and Its Effect on the Environment in Jos, North central, Nigeria. They both concluded that respondents preferred modern, cleaner, and more efficient cooking energy sources like Gas/LPG and electricity if household incomes.

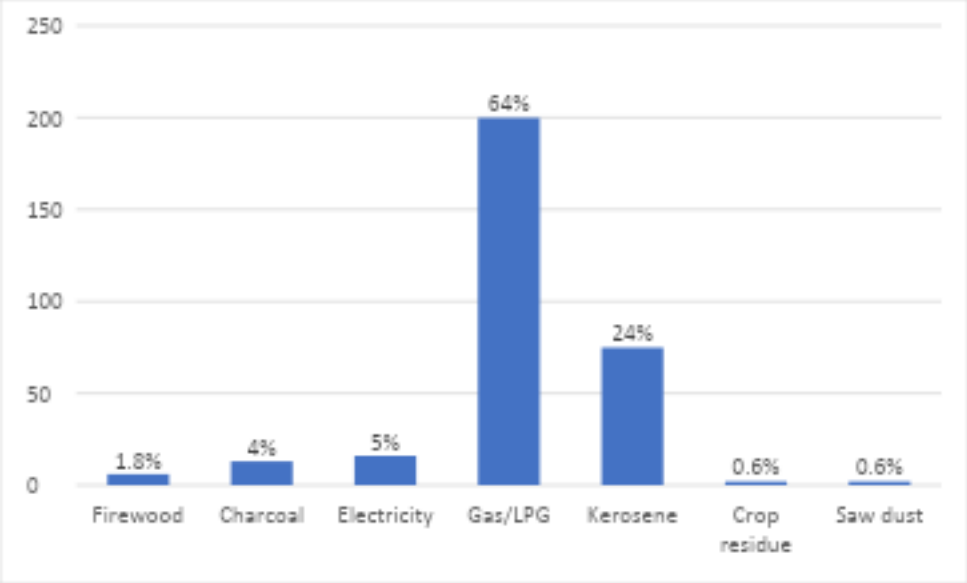

Figure 5: Preference for Cooking Energy Sources in Urban Communities if Income Increased in the Study Area

Results in Figure 5 shows the projected preferences for different types of cooking energy among urban households if their income were to increase. Only 1.8% of respondents would choose firewood. This low percentage suggests that even with an increase in income, firewood remains an unpopular option, likely due to its inefficiency and the availability of better alternatives. Also, 4% of respondents would prefer charcoal. Although a slight increase compared to current preferences, it remains a minor choice, possibly for specific cooking needs or cultural reasons. Just 5% of respondents would opt for electricity. This is a significant decrease from the current 56%, indicating that many households would switch to other energy sources if their income were increased, likely due to the higher efficiency and convenience of alternatives.

Majority 64% of respondents would prefer Gas/LPG. This significant increase shows a strong preference for Gas/LPG with higher income, reflecting its efficiency, cleanliness, and convenience as a cooking energy source. While 24% of respondents would choose kerosene. This represents a substantial increase from the current 5%, suggesting that kerosene is seen as a viable alternative for many households if they have more financial resources. Only 0.6% of respondents would choose crop residue, indicating that it remains an unpopular choice even with increased income. Also, 0.6% of respondents would prefer sawdust, showing no significant change in preference with higher income.

The results suggest a significant shift towards more modern and efficient cooking energy sources with an increase in income among urban households. The overwhelming preference for Gas/LPG (64%) highlights its desirability as a clean, efficient, and convenient cooking energy source when affordability is less of a concern. The decreased preference for electricity (5%) compared to the current usage indicates that many households would switch to Gas/LPG if they could afford it. This work conformed to the work of Ampitan and Oyerinde (2015) who studied Pattern of Domestic Energy Utilization and its effect on the environment in Jos, North central, Nigeria. Those respondents with higher income preferred Gas/LPG, reflecting its efficiency, cleanliness, and convenience as a cooking energy source.

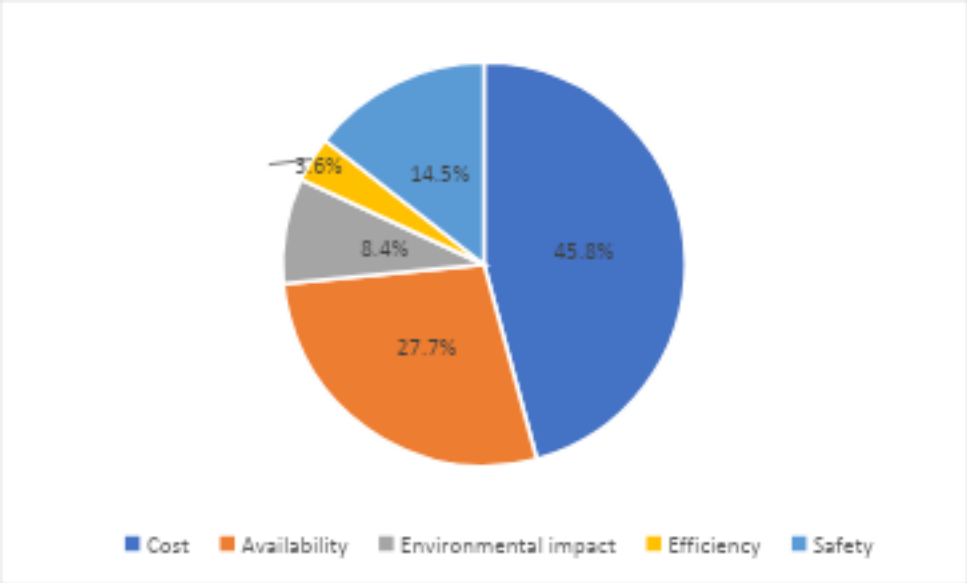

Figure 6: Factors considered when choosing Cooking Energy Sources in Rural Communities in the Study Area

Results in Figure 6 provides information on the factors that rural communities in a specific study area consider when choosing cooking energy sources. Almost half (45.8%) of the respondents considered cost as the primary factor when choosing their cooking energy sources. This indicates that affordability is the most significant concern for nearly half of the rural households. Slightly above quarter (27.7%) of the respondents prioritized availability. This shows that over a quarter of the households choose their cooking energy sources based on how easily accessible they are. Also, 14.5% of the respondents considered safety. This reflects that a significant portion of households is concerned about the safety implications of the energy sources they use at a point in time. Just 8.4% of the respondents considered the environmental impact of their cooking energy sources. This suggests that a smaller segment of the population is aware of and concerned about the environmental consequences of their choices. Also, 3.6% of the respondents considered efficiency. This indicates that very few households prioritize how effectively the energy source converts fuel into usable heat.

The most critical factors for the majority of households are cost (45.8%) and availability (27.7%). This indicates that economic considerations and ease of access are the primary drivers in the decision-making process for cooking energy sources. Safety is an important factor for

14.5% of the households, reflecting concerns about the potential risks associated with using certain fuels, such as fire hazards or health risks from indoor air pollution. A smaller portion of the population (8.4%) took into account the environmental impact, thereby suggesting some level of awareness about sustainability, although it is not the dominant concern. Efficiency is the least considered factor (3.6%), indicating that most households may not prioritize how well the energy source performs in terms of fuel use, possibly due to a lack of options or information.

These findings highlight that economic and practical considerations are at the forefront of decision-making for rural households when it comes to cooking energy sources. While there is some awareness of safety and environmental impact. These factors are less influential compared to cost and availability. This underscores the need for policies and interventions that can provide affordable, accessible, and safe cooking energy alternatives, while also raising awareness about efficiency and environmental impacts. This findings agrees with Irimiya, Humphery and Aondover (2013) in their study on the assessment of energy use pattern in residential buildings of Kano and Kaduna Northern Nigeria and Oyeniran and Isola (2023) who also studied patterns and determinants of household cooking fuel choice in Nigeria that economic and practical considerations are considered in decision-making for rural households when it comes to cooking energy sources.

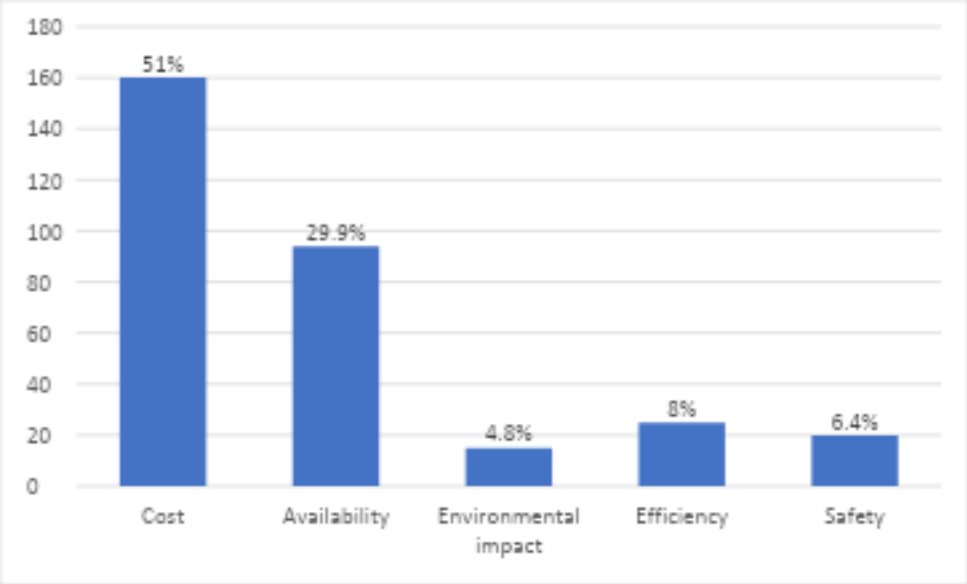

Figure 7: Factors Considered when Choosing Cooking Energy Sources by Urban Households in the Study Area

The findings in Figure 7 provides information on the factors considered by urban households in the study area when choosing their cooking energy sources. Majority (51.0%) of the respondents considered cost as a significant factor when choosing their cooking energy sources. This indicates that the majority of urban households prioritized affordability in their decision-making process. Also, 29.9% of the respondents prioritized availability. This suggests that nearly one-third of urban households based their choice of cooking energy sources on how easily accessible they are. Only 4.8% of the respondents considered the environmental impact. This indicates that a small but notable portion of urban households are concerned about the

environmental consequences of their cooking energy sources. And 8.0% of the respondents considered efficiency. This suggests that a modest segment of households prioritized how effectively the energy source converts fuel into usable heat. Again, 6.4% of the respondents considered safety. This reflects that a smaller portion of households are concerned about the safety implications of the energy sources they use. Cost is the most significant factor for urban households, with over half of the respondents (51.0%) who prioritized affordability. This underscores the importance of economic considerations in urban settings. Nearly one-third of households (29.9%) prioritized the availability of cooking energy sources, suggesting that accessibility plays a significant role in decision-making, possibly influenced by infrastructure and distribution networks. Though only a small percentage of households (4.8%) considered environmental impact, this still represents a notable portion of the urban population. This suggests a growing awareness of sustainability issues, albeit with lower prioritization compared to cost and availability. Efficiency and safety are also considerations for a minority of households, indicating some level of concern for the effectiveness and safety of cooking energy sources.

These results provide valuable insights for policy-makers, energy providers, and advocates seeking to promote sustainable and affordable cooking energy solutions in urban areas. These findings confirm the results of Irimiya, Humphery and Aondover (2013) in their study on the assessment of energy use patterns in residential buildings of Kano and Kaduna Northern Nigeria. That households prioritized affordability of energy sources as the bases of utilization.

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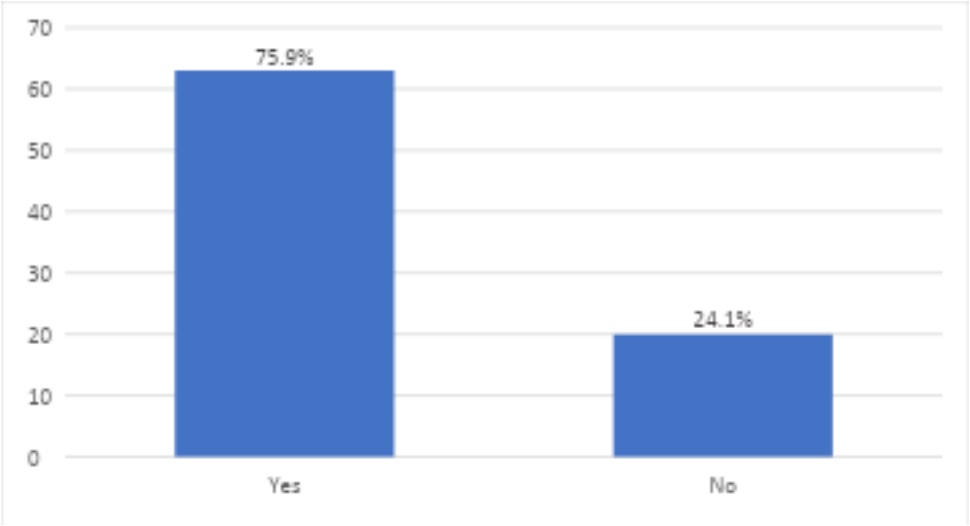

Figure 8: Switching to different cooking energy source by Rural Communities in the Study Area

Figure 8 provides information on the willingness or occurrence of switching to different cooking energy sources by rural communities in a specific study area. In figure 8, most (75.9%) of the respondents had switched or were willing to switch to different cooking energy sources. This indicates that a significant majority of rural households are open to changing their cooking energy sources, possibly in search of better options in terms of cost, availability, safety,

efficiency, or environmental impact. Also, 24.1% of the respondents had not switched or were not willing to switch their cooking energy sources. This suggests that nearly a quarter of the households preferred to hold onto their current energy sources, likely due to satisfaction with their existing choice, resistance to change, or lack of better alternatives.

The fact that 75.9% of households are open to switching indicates a significant level of flexibility and readiness to adopt new cooking energy sources. This could be driven by dissatisfaction with current options or the availability of more attractive alternatives. The 24.1% who are not willing to switch could be influenced by several factors, such as high satisfaction with their current energy sources, perceived risks or costs associated with switching, or limited access to alternative options. The high willingness to switch suggests that interventions aimed at promoting cleaner, safer, and more efficient cooking energy sources could be well-received. However, addressing the concerns and barriers faced by the 24.1% who are resistant to change will be crucial for ensuring comprehensive adoption of improved energy sources. These findings indicate a strong potential for transitions to better cooking energy solutions in rural areas, provided that the alternatives are made accessible, affordable, and are accompanied by awareness-raising and support initiatives. This work is related to the work of Shittu, Idowu, Otunaiya & Ismail (2004) on the demand for energy among households in Ijebu division, Ogun state, Nigeria and that of Udofia & Thompson (2015) who studied the socioeconomic impacts of kerosene (paraffin) pricing on alternative sources of energy in Ibadan, South West Nigeria. That respondents are willing to change to better cooking energy solutions in rural areas, provided that the alternatives are made accessible, affordable.

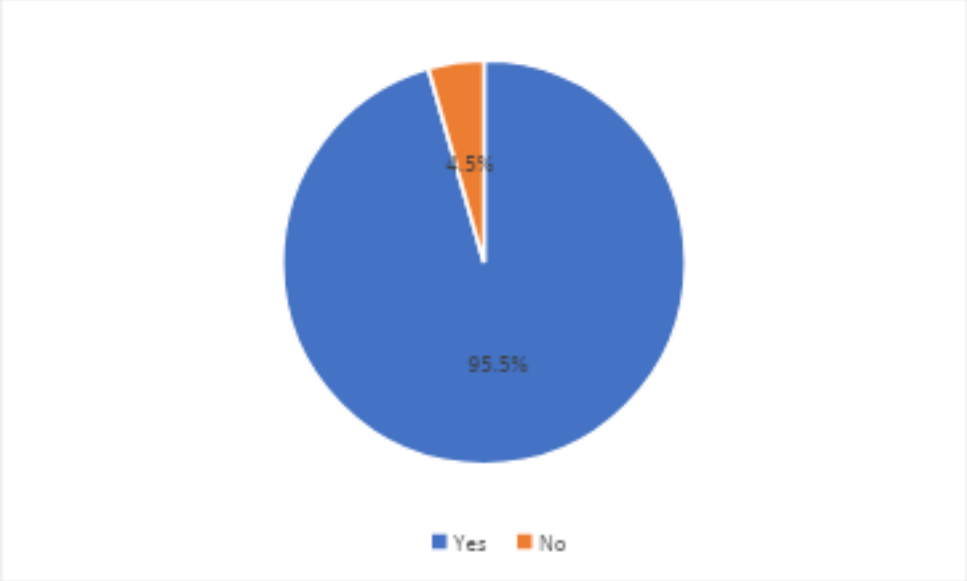

Figure 9: Consideration of Switching to different Cooking Energy Sources by Urban Households in the Study Area

Results in Figure 9 provides data on the consideration of switching to different cooking energy sources among urban households in the study area. Majority (95.5%) of the respondents considered switching to different cooking energy sources. This indicates that the overwhelming

majority of urban households are open to the idea of changing their current energy sources for cooking.

About 4.5% of the respondents did not consider switching. This represents a small minority of households who were not interested in changing their current cooking energy sources. The data shows a very high percentage (95.5%) of urban households who consider switching to different cooking energy sources. This suggests a significant openness to exploring alternative options among urban residents. Only a small fraction (4.5%) of households did not consider switching. While this is a minority, understanding the reasons behind their reluctance could provide insights into potential barriers to adoption and informed targeted interventions. This conforms to the findings of Aziz, Barua and Chowdhury (2022) and further confirms the assertion of Oyeniran and Isola (2023) who noted that a considerable proportion of the population in urban households are open to the idea of changing their current energy sources for cooking.

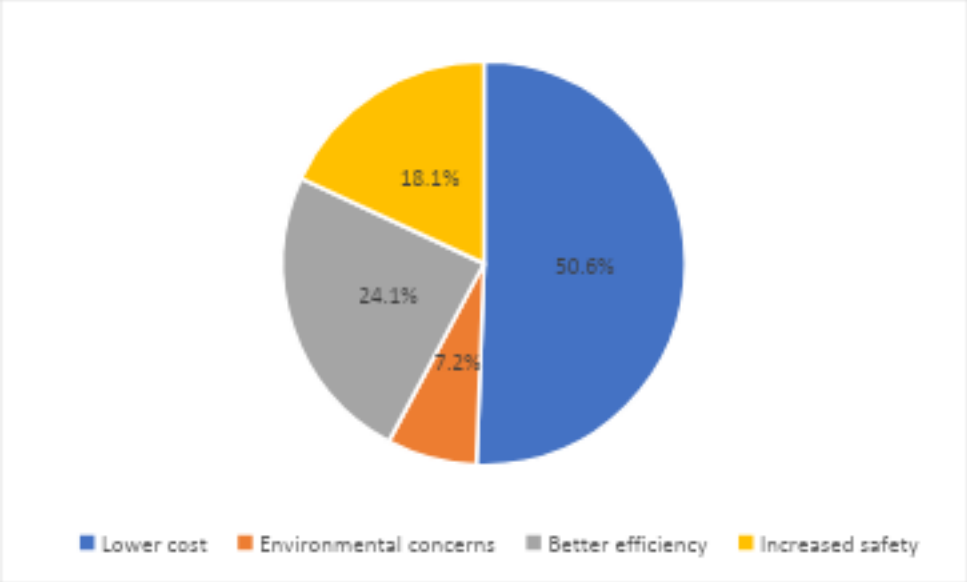

Figure 10: Reasons for Switching to different Cooking Energy Source by Rural Dwellers in the Study Area

Results in Figure 10 provides information on the reasons why rural dwellers in the study area switch to different cooking energy sources. Half (50.6%) of the respondents switched to a different cooking energy source primarily due to lower cost. This indicates that cost savings is the most significant motivator for half of the rural households, reflecting the importance of affordability in their decision-making process. Also, 24.1% of the respondents switched to a different cooking energy source for better efficiency. This shows that nearly a quarter of the households prioritized the effectiveness and performance of the energy source, likely seeking options that provide more heat with less fuel. About 18.1% of the respondents switched due to increased safety. This indicates that a significant portion of households are motivated by the desire to reduce risks associated with their cooking energy sources, such as fire hazards or health issues from smoke. Again, 7.2% of the respondents switched because of environmental concerns. This suggests that a smaller segment of the population is conscious of the environmental impact of their cooking energy sources and seeks more sustainable options.

Lower cost is the predominant reason for switching, highlighting the critical role of economic factors in the decision to change cooking energy sources. Better efficiency and increased safety are also significant factors, together accounting for 42.2% of the reasons for switching. This shows that many households were looking for more effective and safer cooking solutions. Although environmental concerns motivated only 7.2% of the households, this indicates some level of environmental awareness among the rural population. This is a smaller but important group that values the ecological impact of their energy choices. Programs aimed at encouraging the adoption of cleaner cooking energy sources should emphasize their cost-effectiveness, efficiency, and safety to appeal to the primary motivations of rural households. Additionally, raising awareness about the environmental benefits could gradually increase the importance of this factor in decision-making.

These findings suggest that initiatives to promote alternative cooking energy sources in rural areas will likely be successful if they address the key concerns of cost, efficiency, and safety environmental benefits, while currently a less significant motivator could be increasingly emphasized as part of broader educational and outreach efforts. This finding is in agreement with the work of Desalu (2012), Obayelu, Lawal, and Omotulyole, (2017) that to promote alternative cooking energy sources in rural areas would likely be successful if they address the key concerns of rural users; cost and efficiency.

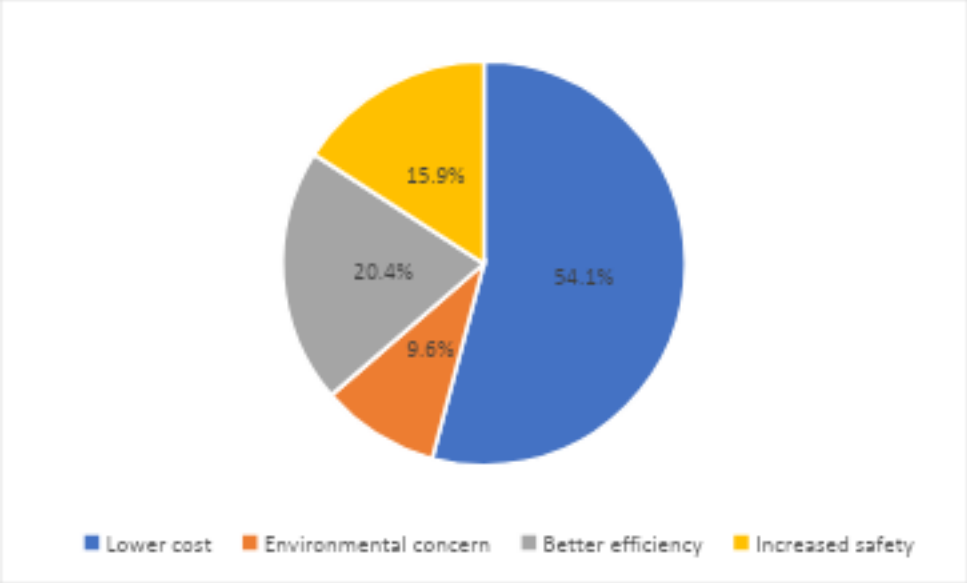

Figure 11: Reasons for Switching to different Cooking Energy Source by Urban Households in the Study Area

Results in Figure 11 provides data on the reasons why urban households in the study area are considering switching to different cooking energy sources. Slightly above half (54.1%) of the respondents considered lower cost as the primary reason for switching to a different cooking energy source. This indicates that cost savings are the most significant motivating factor for more than half of the urban households. The 9.6% of the respondents cited environmental concerns as their reason for switching. This suggests that a smaller, yet notable, portion of urban households were motivated by the desire to reduce their environmental impact. Only 20.4% of the

respondents were driven by the desire for better efficiency. This indicates that a significant number of households were looking for energy sources that provide more effective energy use and possibly quicker cooking times. About 16% of the respondents prioritized increased safety as their reason for switching. This shows that safety concerns are an important factor for a considerable segment of urban households.

Lower cost is the most significant reason for switching, with 54.1% of households citing it. This highlights the critical role of economic factors in the decision-making process for urban households. Better efficiency (20.4%) and increased safety (15.9%) are also important reasons, indicating that households value improvements in the performance and safety of their cooking energy sources. Although only 9.6% of households cited environmental concerns, this still represents a meaningful portion of the population that is aware of and motivated by environmental issues. Efforts to promote the adoption of alternative cooking energy sources should emphasize their cost-effectiveness to appeal to the majority of households. These findings underscore the importance of addressing economic concerns while also promoting the additional benefits of efficiency, safety, and environmental sustainability in efforts to encourage the switch to alternative cooking energy sources in urban areas.

Table 2: ANOVA between Cooking Energy Types used by Rural and Urban Households in the Study Area

	Sum of Squares	**Df**	**Mean Square**	**F**	**Sig**
Between Groups	49.500	10	4.950	2.285	0.026
Within Groups	6.500	3	2.167		
Total	**56.000**	**13**			

Table 2 represents an analysis of variance comparing the cooking energy types used by rural and urban households in the study area. The results reveal that the F-value (2.285) which compares the variability between the groups to the variability within the groups. A higher F-value suggests a greater difference between group means relative to within group variability. The significance value (Sig.) of 0.026 is less than the conventional significance level of 0.05. This indicates that the observed difference is statistically significant. Suggesting that there is indeed a difference between the cooking energy types used by rural and urban households in the study area, with rural and urban households showing variations in their preferences for cooking energy types. These finding is in conformity with the work of Obayelu, Lawal, and Omotulyole (2017) who studied comparative analysis of access and preference of rural and urban households for cooking energy and the determinants in Ogun State, Nigeria, and the work of Zaku, Abdallah, Olayande, Kabir and Tukur (2015) who investigated the household energy use in Gwagwalada Town and Gwako village of Gwagwalada area council; FCT Abuja Nigeria that, there is difference between the cooking energy types used by rural and urban households.

4. CONCLUSION

The study revealed that firewood dominates the rural households' cooking energy preference while Gas/LPG dominates the urban households cooking energy preference. Also, the study

revealed that rural households and urban households would both prefer Gas/LPG if their income increased. The findings underscore the critical role of socio-economic factors in determining cooking energy preferences in both rural and urban households in the study area. The study highlights a strong inclination towards cleaner and more efficient cooking energy sources like Gas/LPG, especially if economic conditions improve.

5. RECOMMENDATIONS

Government should develop and implement energy policies that address the unique needs of rural and urban households. In rural areas, increase the availability and affordability of cleaner cooking options like improved cook stoves, biogas, and LPG through subsidies, micro-financing, and community-based distribution. Government should enhance the infrastructure for electricity and gas supply to ensure reliable and cost-effective access to cleaner energy sources in urban areas. Government should implement income-support and financing programs to facilitate the transition to Gas/LPG for both rural and urban households. In rural areas, the government should introduce subsidies and micro-loans to make Gas/LPG affordable and accessible, and invest in distribution infrastructure while for urban households, provide incentives like tax breaks or discounts on Gas/LPG appliances and fuel to encourage adoption.

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