DEMAND RESPONSE PROGRAMS AND ENERGY EFFICIENCY IN ANAMBRA STATE

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Abstract

Nigeria's energy sector has been facing enormous challenges. The energy infrastructure is inadequate and continually strained by increasing energy demand vis-à-vis a rapidly growing population and expanding industrial activities. Consequently, frequent outages and epileptic power supply have become the rule rather than the exception. This has forced citizens to seek alternative power supply such as power generating sets, with the attendant environmental consequences. Under the circumstance, the deployment of effective Demand Response (DR) programs that would manage peak load and stabilize the grid becomes expedient. This paper examines the status and prospects of DR programs in managing the energy sector in Anambra State. It investigated whether demand response programs have been deployed and the potential benefits they hold for energy efficiency in the State. The study was **framed within the Innovation Diffusion Theory** and relied on both primary and secondary sources to generate data. Specifically, data were sourced from interviews with electricity consumers and staff of the distribution company, field observations, and documentary evidence. The study found no evidence of active DR program deployment in Anambra State but revealed strong prospects for their adoption in enhancing energy efficiency. It therefore recommends sensitization campaigns, regulatory support, and pilot projects to facilitate the eventual deployment of DR programs while efforts to improve energy infrastructure continue.

Keywords: Demand Response programs, energy efficiency, energy infrastructure, power supply

Introduction

The concern for sustainable energy management has intensified globally. In this context, strategies for demand response programs (DRPs) designed to adjust electricity consumption patterns in response to supply conditions and energy efficiency initiatives have emerged as critical tools for optimizing the energy system. This is aimed at reducing overall energy consumption through technological improvements and behavioural changes. DRPs and energy efficiency initiatives are critical tools in managing electricity demand and enhancing the operational efficiency of power systems. They facilitate a shift towards more sustainable energy consumption practices and contribute to the stability of power grids, which is crucial in regions facing frequent power shortages and supply inefficiencies.

In Nigeria, the power sector faces significant challenges that include frequent outages, limited capacity, constant grid collapse, and inefficiencies in power use. These particularly affect the South East Nigeria, where energy consumption patterns and infrastructural challenges pose significant obstacles to energy efficiency. Anambra State, Nigeria faces distinct energy challenges. The State is among those rated as having a relatively low level of electrification compared to other parts of the country, with frequent power outages and a high dependency on expensive diesel generators (Nigerian Electricity Regulatory Commission, 2021). In the State, energy access is often inconsistent with the demand and the cost of electricity is high. It is believed that improving energy efficiency can lead to significant cost-savings and enhanced reliability of energy services. It also aligns with broader environmental goals by reducing greenhouse gas emissions and minimizing the environmental impact of energy production (Gillingham, Rapson, & Wagner, 2016).

It is also on record that many residential and commercial buildings in the state fall within the range of those observed to be operating with outdated and inefficient equipment (World Bank, 2019). It is quite agreeable that addressing these inefficiencies can enhance energy savings and support sustainable development goals. These challenges in the state underscore the need for measures to improve energy security and economic performance. As the state in particular, and Nigeria in general, continue to grapple with these chronic energy challenges, the integration of demand response programs and energy efficiency measures have been identified as presenting promising path toward a more sustainable and reliable energy future. For instance, studies have shown that DRPs can significantly reduce peak demand and associated costs in developing regions, thereby improving overall grid stability (Hledik, 2015). Therefore, integrating these strategies can help not only to stabilize the grid but also offer economic benefits by reducing energy costs for consumers and businesses.

Demand Response Programs involve a range of strategies designed to incentivize consumers to alter their energy usage patterns in response to supply conditions, such as peak demand periods or high electricity prices (Faruqui & Sergici, 2013). These programs can be particularly effective in regions with unreliable power supplies, as they help balance supply and demand, reduce strain on the grid, and lower the likelihood of blackouts. By encouraging consumers to shift their energy use away from peak times, DRPs can also reduce the need for additional generation capacity, thus lowering overall system costs (Joskow & Tirole, 2007). Energy efficiency, on the other hand, focuses on reducing the amount of energy required to provide the same level of service or output. This can be achieved through the adoption of energy-efficient technologies, better insulation, and improved operational practices (IEA, 2020). Despite the potential benefits, it appears that the Demand Response Programs (DRPs) and energy efficiency initiatives have not yet been given serious consideration in Anambra State. Thus, there is little or no evidence of structured deployment of DRPs in the state. This situation can be attributed to several barriers that include inadequate infrastructure, lack of awareness, and limited financial resources. These challenges highlight the urgent need to examine not only the potential role of DRPs in addressing energy efficiency concerns, but also the extent to which Anambra State is prepared to adopt such programs.

Objectives of the Study

The broad objective of this study is to investigate the status and prospects of Demand Response Programs (DRPs) in improving energy efficiency in Anambra State. Specifically, the paper seeks to:

1. Determine whether Demand Response Programs (DRPs) have been deployed in managing the energy sector in Anambra State.
2. Examine the potential benefits and prospects of DRPs for enhancing energy efficiency in Anambra State.

Conceptual Clarifications

Demand Response Programs

Demand response (DR) is defined as changes in electricity usage by end-use customers from their normal consumption patterns in response to changes in the price of electricity over time, or to incentive payments designed to induce lower electricity use at times of high wholesale market prices or when system reliability is jeopardized (U.S. Department of Energy, 2006; Federal Energy Regulatory Commission, 2012). In practice, DR programs are widely deployed to reduce stress on the grid during peak demand hours or emergency situations (Albadi & El-Saadany, 2008; Siano, 2014; Zhang et al., 2023).

Through DR programs, utilities incentivize consumers to reschedule or shift their consumption patterns (Deng, Yang, Chow, & Chen, 2015). These programs have become increasingly popular in modern power systems because of their ability to enhance grid flexibility and reliability (Zhang, de Dear, & Candido, 2016; Rahman, Alfaki, Shafiullah, Shoeb, & Jamal, 2016; Yang, Chavali, & Nehorai, 2012; Park et al., 2017). As emphasized by the Federal Energy Regulatory Commission (2012), demand response essentially entails adjustments in electricity usage prompted by price signals or incentive mechanisms, with the aim of lowering demand during periods of high costs or potential threats to system stability.

As variable sources such as wind and solar provide an increasing proportion of electricity to the grid, new forms of demand response are being developed with capabilities that surpass traditional peak load-reducing demand response. Berst (2011), argued that this next generation of demand response is automated and often linked to some form of energy storage in order to quickly respond to changes in system frequency or to increase demand during periods of oversupply, which improves the utilization of many renewable resources, as well as traditional thermal units. In recognition of its expanded role, the Federal Energy Regulatory Commission's (2010) *National Action Plan for Demand Response* emphasizes that demand response is not just confined to reducing electricity consumption during peak demand hours. It equally includes actions that can modify any aspect of a customer's load profile. This broader perspective underscores the potential of demand response to facilitate the integration of variable renewable energy sources through technologies such as energy storage (e.g., electric vehicle batteries and thermal storage). It also highlights the capacity of demand response to provide ancillary services, including frequency regulation and operating reserves (Palensky & Dietrich, 2011; Siano, 2014).

Types of Demand Response Programmes

Globally, Demand Response (DR) programmes are broadly categorized based on how consumers are incentivized to adjust their electricity usage during peak periods or grid stress events. The key types include **incentive-based programmes** and **price-based programmes** (Palensky & Dietrich, 2011; Albadi & El-Saadany, 2008). These categorizations provide a useful framework for understanding the range of strategies that have been successfully applied in advanced electricity markets. Although such programmes have not yet been formally deployed in Anambra State, examining their structures and mechanisms provides insight into the potential models that could be adopted in the future.

1. Incentive-Based Demand Response (IBDR)

Incentive-based DR programmes provide direct payments or other forms of compensation to consumers who agree to reduce their load when requested. This category comprises several subtypes:

- **Direct Load Control (DLC):** Utilities remotely control specific appliances (e.g., HVAC systems) during peak periods in exchange for incentives (Faruqui & Sergici, 2010).
- **Interruptible/Curtailable Programs:** Large consumers agree to reduce load during emergencies, with penalties applied for non-compliance (Gellings, 1985).
- **Demand Bidding/Buyback Programs:** Customers offer load reductions into a market, receiving compensation if their bids are accepted (Albadi & El-Saadany, 2008).
- **Capacity Market Participation:** Consumers commit to lowering demand during emergencies and are compensated as capacity resources (FERC, 2018).
- **Ancillary Services Participation:** In deregulated markets, DR resources provide services such as frequency regulation and spinning reserves (Siano, 2014).

2. Price-Based Demand Response (PBDR)

Price-based DR relies on variable electricity pricing to encourage consumers to adjust their consumption patterns without direct intervention by the utility. Common approaches include:

- **Time-of-Use (TOU) Pricing:** Electricity prices vary across fixed time blocks, encouraging off-peak consumption (Faruqui & Sergici, 2010).

- **Real-Time Pricing (RTP):** Prices fluctuate hourly in response to wholesale market conditions, promoting immediate responsiveness (Borenstein, 2005).
- **Critical Peak Pricing (CPP):** Exceptionally high prices are applied during designated peak events to discourage consumption (Albadi & El-Saadany, 2008).
- **Peak Time Rebates (PTR):** Consumers receive rebates for voluntarily reducing demand during peak periods, without penalties for non-participation (Faruqui, Hledik, & Lessem, 2014).

These DR strategies are pivotal in improving grid reliability, integrating renewable energy, and reducing the need for costly peaking power plants (Siano, 2014). The choice of DR programme depends on regulatory frameworks, market structures, and the consumer segment targeted. However, while these strategies are widely recognized in global practice, there are strong indications that they have not been deployed in Anambra State. Accordingly, this study explores the prospects for their future adoption and potential impact on energy efficiency.

Energy Efficiency

Energy is an essential ingredient in people's daily activities, as they rely on energy in virtually everything they do. In the same vein, every country relies on energy in order to achieve meaningful development. Energy is needed for domestic, agricultural, industrial, commercial, official, and other various activities. Thus, the need for energy in all sectors of life cannot be over-emphasized. Access to energy constitutes one of the distinguishing features between the poor countries and the rich ones. The developed countries of the world have and consume far more energy than the developing ones.

Çengel (2011) states that energy efficiency is to reduce energy use to the minimum level, but to do so without reducing the standard of living, the production quality, and the profitability. According to Patterson (1996), energy efficiency is a generic term and there is no quantitative measure of 'energy efficiency' that is not equivocal. On the contrary, one should rely on a number of indicators to measure changes in energy efficiency. Studies claim that there are a number of barriers that inhibit the adoption of cost-effective energy efficiency measures (Sardianou 2008). Although there is a need for industrial energy efficiency, studies indicate that the measurements for efficient energy conservation in relation to costs are not always implemented, which serves as a proof that there exists an energy efficiency gap. This gap is explained by the existence of barriers to energy efficiency (Brown 1990; Hirst 1990). An industrial energy program aims to reduce barriers that prevent energy efficiency. For this reason, it is extremely important to detect obstacles that restrict markets for energy efficient technologies in order to effectively reduce these barriers (Dotzauer, 2010; Thollander 2010).

Efforts to improve energy efficiency have never been in short supply. May et al (2015) and Zhang and Chiong (2015) have contributed in this process by using a genetic algorithm (GA) to improve energy efficiency on the performances of a job-shop. Whereas May et al considered the objectives for productivity and energy consumption in investigating the effects of production scheduling policies, Zhang and Chiong dealt with incorporating it with two problem-specific local improvement strategies to minimize energy consumption into the job-shop scheduling. Salido et al (2015) equally contributed by using the GA to solve a job-shop scheduling problem, in which machines can consume different amounts of energy to process tasks at different rates. Frigerio and Matta (2015) propose a machinery management method through an algorithm in order to find ways to turn off the machines when they are not being used and connect them again when they are needed, thus generating energy savings. The authors continue the previous study by analyzing the machinery management in accordance with product production lines.

Background Information on Anambra and Energy Issues

Anambra is one of the thirty-six states in the Nigerian federation and among the five states located in the South eastern part of the country. As indicated by Odum (2023), the South East has peculiar developmental challenges. The energy challenge is one of them. like other states within the South East, Anambra has a very high population density and a relatively small land space. There is no better way of highlighting the population density of Anambra State than comparing it with that of States such as Bauchi and Yobe. From the records provided by *MACOS Urban Management Consultants* (nd), which were generated from National Population Commission, 2006, as well as the NPC Report, 1991, Anambra State has a population; landmass; and population density (Km^2) of 4,182,032; 4,844.00 square kilometres; and 863 respectively. On the other hand, Bauchi State with a population of 4,676,465 has a landmass of 64,605.00 square kilometres and population density of 72 while Yobe State with a population of 2,321,591 has a landmass of 45,270.00 square kilometres and population density of 51. With a population density of 863, one may begin to imagine what the figure portends for infrastructural facilities such as transformers and power stations, especially when they are inadequate.

Anambra has three major cities namely, Awka, Onitsha, and Nnewi, with each having high level of commercial and industrial activities as well as high density of residential buildings. Apart from these three major cities, there are other semi urban areas with various degrees of industrial activities and high concentration of residential homes. Most parts of the states have been provided with electricity. Standing at the 8th position with 14.8%, Anambra is among the ten Nigerian States identified in 2019 as having the lowest rate of poverty (National Bureau of Statistics, 2020; Sasu, 2022). This relatively low poverty rate suggests comparatively higher purchasing power among households, offices, and commercial centres, which in turn is associated with increased ownership and use of electricity-powered appliances. Consequently, electricity demand in the state is likely to be higher than what is obtainable in less affluent states.

Public power supply in Anambra state has not been commensurate with energy needs. According to World Bank (2021), Anambra State, faces significant energy challenges. The State is not spared from the syndrome of epileptic and unreliable public power supply that characterizes the Nigerian energy sector. The power sector's issues are rooted in infrastructural deficit, poor grid management, and lack of investment in modern technologies (Adenikinju, 2020). It is common to witness regular power outages as well as the phenomenon generally described as 'low current' in Nigerian parlance due to factors associated with inadequate and outdated energy infrastructure, power overload, negligence and abandonment of responsibilities by power distribution companies, vandalism, and sharp practices by consumers. In some cases, power outages can last for several months depending on the readiness of residents within the affected area to contribute money and replace an item in the public power supply unit, which got spoilt, stolen, or vandalised. Owing to the fact that many households and owners of electricity-dependent businesses can afford it, the use of power generating sets is prevalent in the State.

In most places, there are usually regular power outages with no known schedule for public power supply. This accounts for the common practice of electricity users turning on and using their electrical gadgets at the same time whenever public power supply is restored – a practice that contributes to the 'low current' syndrome, which makes it difficult to determine a normal consumption pattern and regulate the supply-demand flow efficiently. Again, there seems to be a general habit of disregard for energy saving measures among electricity consumers in the State. Such class of consumers can afford to turn on electrical gadgets and leave it on even when they do not have immediate need for it. There is also a noticeable tendency among many consumers towards engaging in 'illegal connections' such as bypassing the electricity metre or allowing illegal consumers have access to electricity.

In the light of the above, it stands to reason that DRPs are essential in the effort to improve the power situation in Anambra state vis-à-vis balancing supply and demand efficiently. However, there are strong indications that the implementation of such programs is yet to take strong roots within the State.

Theoretical Framework

The study adopts the Diffusion of Innovation (DoI) theory, originally developed by Everett Rogers (1962), as its guiding framework. The theory explains how new ideas, technologies, or practices spread within a social system and the conditions that influence their acceptance. According to Rogers, innovations diffuse through identifiable stages, beginning with awareness, followed by persuasion, decision, implementation, and confirmation. Adoption is also influenced by factors such as the relative advantage of the innovation, its compatibility with existing practices, the complexity of understanding and applying it, the degree to which it can be tested on a limited basis (trialability), and the visibility of its outcomes (observability). Furthermore, the rate of adoption within a community or sector often depends on the roles of different categories of adopters, namely innovators, early adopters, early majority, late majority, and laggards.

This theory is particularly relevant to the study because Demand Response Programs (DRPs) can be viewed as innovations within the energy sector, requiring consumer awareness, institutional support, and infrastructural readiness before they can diffuse effectively. In the context of Anambra State, where DRPs have not yet been fully deployed, the DoI framework provides an analytical lens for understanding why adoption has not occurred and what conditions may be necessary for future acceptance. For instance, low awareness among stakeholders corresponds to the absence of progress beyond the knowledge stage of diffusion. Similarly, challenges such as inadequate infrastructure and lack of regulatory support reflect barriers to compatibility and trialability, which prevent the movement of DRPs from potential to practice.

At the same time, the theory highlights the potential for adoption once enabling conditions are met. The relative advantage of DRPs, including improved energy efficiency, reduced dependence on generators, and enhanced reliability of electricity supply, suggests that their prospects for acceptance are strong if consumers and institutions perceive tangible benefits. The positive perceptions already expressed by stakeholders in Anambra State demonstrate that the seeds of diffusion exist, even in the absence of active deployment. Thus, the DoI framework is valuable in showing both the current status of DRPs marked by limited or no deployment, and the prospects of their adoption in the future if barriers are addressed through policy reforms, sensitization, and infrastructural investment.

In this way, the theory allows the study to make a prognostic analysis of how DRPs could spread and contribute to energy efficiency in Anambra State. By framing DRPs as innovations within a social system, the DoI framework captures both their challenges and opportunities, making it a fitting foundation for understanding the dynamics of their status and potential.

Methodology

The study relied on both primary and secondary sources of data. Primary data were obtained through interviews conducted with electricity consumers and staff of the Enugu Electricity Distribution Company (EEDC). Secondary data were drawn from published reports, policy documents, and relevant literature on Demand Response Programs (DRPs) and energy efficiency.

The study was conducted in Anambra State, Nigeria. According to the National Population Commission, Anambra State had a population of 4,177,828 (NPC, 2006). Using Slovin's (1960) formula with a 5% margin of error, a sample size of 400 consumers was determined. These respondents were selected from three major urban centers, Onitsha, Nnewi, and Awka, which were purposively chosen because of their high levels of electricity access, demand, and concentration of residential, commercial, and industrial activities.

In addition to consumer interviews, a purposive sample of 10 officials from the Enugu Electricity Distribution Company (EEDC) was selected. These officials were drawn from management and technical units directly responsible for power distribution in Anambra State. Their inclusion was essential because they are uniquely positioned to provide authoritative information on whether

DRPs have been deployed in the state, and if so, in what forms.

Therefore, the total respondents included 400 consumers (statistical sample) and 10 EEDC officials (key informants). While the consumer interviews focused on awareness, perceptions, and prospects of DRPs, the EEDC interviews concentrated on establishing the deployment status and institutional readiness for DRPs.

Sample Distribution

The study adopted a total sample of 410 respondents, consisting of 400 electricity consumers across Anambra's three major urban centres, Onitsha, Nnewi, and Awka as well as 10 purposively selected officials of the Enugu Electricity Distribution Company (EEDC).

The consumer respondents were selected to capture the views of households, businesses, and community members who are directly affected by electricity supply challenges. A proportional allocation ensured fair representation from each city, given their relatively high population and electricity demand. The distribution is presented in Table 1.

Table 1: Distribution of Respondents by City.

City	Number of Respondents	Percentage (%)
Onitsha	135	33.8
Nnewi	135	33.8
Awka	130	32.4
Total	**400**	**100**

Source: Researchers Computation (2025)

Table 2: Distribution of EEDC Key Informants

Category of EEDC Officials	Number Interviewed
Management Staff	4
Technical/Operations Staff	6
Total	**10**

Source: Researchers Computation (2025)

Data Presentation and Analysis

This section presents and analyzes data collected from interviews with 400 electricity consumers in Onitsha, Nnewi, and Awka, as well as 10 purposively selected EEDC officials. The analysis is structured according to the study's two specific objectives.

Objective 1: Determine whether Demand Response Programs (DRPs) have been deployed in managing the energy sector in Anambra State

The question of deployment was addressed directly to EEDC officials. Their responses are summarized in Table 1.

Table 3: EEDC Responses on DRP Deployment

Question	**Yes (Freq, %)**	**No (Freq, %)**	**Remarks (Summary)**
Has EEDC deployed any formal DRP initiatives in Anambra State?	0 (0%)	10 (100%)	Officials confirmed that no structured DRPs (e.g. incentive-based schemes) are currently in place.
Are there pilot or informal practices that resemble DRPs (e.g., manual load shedding, estimated billing)?	4 (40%)	6 (60%)	Some staff noted that practices such as load rationing exist, but these are not recognized DRPs.
Does EEDC have plans or policies to introduce DRPs at the moment?	3 (30%)	7 (70%)	A minority indicated that discussions on demand -side management have been raised but without formal policy backing.
Do you think that the deployment of DRPs holds any prospect of addressing some of the challenges facing the power sector in the country?	0 (0%)	10 (10%)	The interviewees indicated that the deployment of DRPs will go a long way in handling some of the challenges in the sector (e.g. the issue of overloading and power wastages by consumers).

Source: Researchers Computation

Analysis:

The results clearly indicate that **no formal DRPs have been deployed** in Anambra State. Instead, what exists are ad-hoc practices such as load rationing, which cannot be classified as demand response. This aligns with national trends in Nigeria, where DRPs remain largely absent due to lack of regulatory and infrastructural frameworks. Hence, the first objective confirms a **gap between global DRP practices and the current realities in Anambra State**.

Objective 2: Examine the potential benefits and prospects of DRPs for enhancing energy efficiency in Anambra State

Although no DRPs currently exist, consumer interviews were conducted to assess awareness, readiness, and perceived benefits should DRPs be introduced.

Table 4: Consumer Awareness and Readiness for DRPs

Question	Yes (Freq, %)	No (Freq, %)
Are you aware of the concept of DRPs?	20 (5%)	380 (95%)
Are there periods you leave your gadgets on even when they are not in use	384 (96%)	16 (4%)
Would you be willing to adjust electricity usage if incentives were provided?	340 (85%)	60 (15%)
Do you think that use of metres that record the timing of electricity usage and better communication from EEDC would encourage participation in DRPs?	372 (93%)	28 (7%)

Source: Researcher's Computation (2025).

Analysis:

Awareness of DRPs is generally low (5%), indicating that consumer education is lacking. However, willingness to participate is high (85%) if incentives are provided, and an even larger majority (93%) believe technological support like smart meters that can help in tracking compliance would make participation feasible. This suggests that consumer readiness exists but must be matched with utility-driven initiatives and awareness campaigns.

Table 5: Consumer Perceptions and the Potential Benefits of DRPs

Potential Benefit	Yes (Freq, %)	No (Freq, %)
Efficient use of electricity by consumers will increase stability in power supply	350 (87.5%)	50 (12.5%)
Do you prefer using generating sets or the public power supply?	360 (90%)	40 (10%)
Stable public power supply is more cost-saving than use of generating sets	380 (95%)	20 (5%)
Do you think the integration of renewable energy could help towards efficient power supply?	332 (83%)	68 (17%)

Source: Researcher's Computation (2025).

Analysis:

Majority of the respondents align with the objectives of DRPs even without being fully aware of what the programme stands for. This serves as a strong indicator that the DRPs have potential benefits, particularly in improving reliability (87.5%), reducing generator dependence (90%), and promoting energy efficiency (95%). These responses demonstrate that while deployment is absent, there **are immense prospects for the DRPs.**

Discussion of Findings

The study revealed that there is currently no evidence of formal Demand Response Program (DRP) deployment in Anambra State. The distribution company, EEDC, confirmed that no structured demand-side management programs exist; instead, electricity rationing and manual load-shedding remain the primary approaches to balancing supply and demand. This finding highlights a critical gap in energy sector innovation in the state.

Viewed through the lens of the Diffusion of Innovation (DOI) Theory, the absence of DRP deployment reflects a stalled diffusion process. Key attributes of innovation identified by Rogers – such as relative advantage, compatibility, complexity, trialability, and observability—help explain this situation. From the utility's perspective, DRPs are perceived as complex and costly to introduce, requiring smart metering infrastructure, consumer sensitization, and regulatory support. Moreover, the benefits have not been made observable, since EEDC has not demonstrated successful DRP outcomes.

On the demand side, however, the findings suggest a different reality. Consumers demonstrated a strong willingness to participate in DRPs if such programs were introduced, particularly when accompanied by incentives. Many respondents recognized the potential of DRPs to enhance energy efficiency, reduce reliance on generators, and improve reliability of supply. These responses point to a high perception of relative advantage and strong compatibility with existing household coping mechanisms such as rationing electricity and shifting appliance use. In effect, the market is primed for adoption even though the innovation itself has not been initiated.

This creates a paradox: while the supply side has not advanced beyond conventional load shedding, the demand side shows readiness for innovation. The application of DOI thus explains the current status of DRPs in Anambra State as a case of non-diffusion, not because of consumer resistance but because enabling conditions for adoption have not been created. If pilot programs and awareness campaigns were introduced, the trialability and observability of DRPs would likely accelerate diffusion, bridging the gap between consumer readiness and institutional inertia.

Conclusion and Recommendations

This study set out to examine the status and prospects of Demand Response Programs (DRPs) in improving energy efficiency in Anambra State. The findings revealed that no structured DRP has been deployed by the Enugu Electricity Distribution Company (EEDC). Instead, energy management in the state remains largely dependent on manual load shedding and consumer-side alternatives such as use of generators. While this underscores the absence of innovation on the supply side, the study also found that consumers expressed readiness to embrace DRPs, particularly if tied to incentives and supported by reliable communication.

In the absence of actual deployment, the study assumes a prognostic dimension. By analyzing perceptions and the enabling environment, it demonstrates that DRPs hold significant potential for enhancing energy efficiency in Anambra State. Widespread willingness to adopt demand-side management practices suggests that the innovation could diffuse rapidly once introduced, provided the right infrastructural, regulatory, and policy supports are in place.

Accordingly, the study recommends that EEDC, in collaboration with state and federal regulatory bodies, pilot a DRP scheme in high-demand urban areas such as Onitsha, Nnewi, and Awka. This should be accompanied by investments in smart metering infrastructure and consumer sensitization campaigns to make the benefits observable and relatable. Policymakers should also create an enabling regulatory environment that encourages utilities to pursue demand-side management as a complement to supply expansion. If these steps are taken, DRPs could shift the energy management paradigm from reactive rationing to proactive efficiency, reducing power instability, generator reliance, stabilizing demand, and promoting sustainable energy use in Anambra State.

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