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Implementing Dynamic Tariffs for Residential Consumers: A Literature Review

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Highlights

- Discoms must have a deep understanding of consumer attributes before implementing dynamic tariffs.
- Income, education, household composition, and grid characteristics determine the distribution effects of dynamic tariffs.
- The decision to adopt new tariffs needs sustained consumer engagement.
- Technologies can play a pivotal role in helping consumers adapt to new tariffs.

Abstract

Dynamic retail tariffs are expected to be a cost-effective method to integrate variable renewable energy into the electricity grid while leading to higher social welfare. However, the global uptake of dynamic tariffs among residential consumers has been tepid due to complexities in implementing tariffs that match consumer preferences and uncertainties around their distributional effects, leading to unrealized welfare gains for consumers, utilities, and society. With a renewed interest in implementing dynamic tariffs in India following the large-scale rollout of smart consumer meters, this paper reviews recent literature on the attributes that affect the distribution of gains and losses among consumers and influence their uptake of dynamic tariffs. We propose a three-stage implementation framework that starts with getting a deeper understanding of the heterogeneous residential consumer segment and delineates the complementary steps required along with a change in tariff design to increase the likelihood of consumer participation.

Keywords: Dynamic tariffs, literature review, residential consumers

Introduction

There is a growing focus on using demand-side management (DSM) to manage the electricity system reliably with the increasing share of variable renewable energy in the grid. While longer-term DSM strategies like energy efficiency can help manage the multi-year demand growth, real-time strategies such as demand response (DR) can help manage grid operations. Dynamic or time-varying retail tariffs are one such method to mobilize DR. Along with its utility for RE integration, dynamic tariffs can also increase welfare by exposing consumers to charges that reflect system conditions [1]. However, few residential consumers globally use dynamic tariffs. By 2021, only about 8% of all residential customers in the USA had enrolled for any dynamic tariff [2]. In Europe, less than half of the households are supplied under dynamic tariffs where they are offered [3]. In India, out of the 29 states and Union Territories that offer dynamic tariffs to retail consumers, only 9 have optional dynamic tariffs for low-volume or mandatory dynamic tariffs for high-volume residential consumers [4].

There is a renewed push from the Government of India to implement dynamic tariffs for residential consumers with the target of installing smart meters for 250 million non-agricultural consumers by March 2026 [5] and implementing dynamic tariffs for all smart metered consumers from April 2025 [6]. But, given the tepid uptake of such tariffs among residential consumers globally, it is crucial to understand the factors that determine the outcomes of such a move.

This paper reviews the literature on the consumer attributes that affect the distribution of gains and losses from dynamic tariffs among consumers and influence their uptake. The review provides an implementation framework for dynamic tariffs, which starts with improving the understanding of the consumer segments that are likely to respond to time-varying tariffs and delineates the steps required along with a change in tariff design to increase the likelihood of consumer participation. The paper also identifies areas of future research on this theme. Unless specifically mentioned, we use the term “dynamic tariffs” or “time-varying tariffs” to refer to the dominant dynamic tariff designs shown in Table 1 [7].

The paper is structured as follows: Section 2 lays out the methodology used to identify the literature to be reviewed, Section 3 characterizes the identified literature, Section 4 presents a discussion of the reviewed literature with the recommendations drawn from it, and Section 5 concludes.

Table 1: Types of dynamic tariffs and their design features

Tariff design	Features
Time-of-day (ToD) or Time-of-use (ToU)	Pre-defined buckets of hours have higher or lower rates. Where two (peak and off-peak) or three (base, peak, and off-peak) different rates are applicable, they are referred to as two-tier or three-tier ToD/ToU tariffs, respectively.
Critical peak pricing (CPP)	Pre-defined high prices are imposed during severe system constraints or contingencies for a limited number of hours or days, such as during peak summer periods. CPP is usually an overlay on ToD or flat-rate tariffs.
Real-time pricing (RTP)	Retail prices can change hourly or more frequently based on the wholesale electricity prices on a day-ahead or hour-ahead basis.

Methodology

We identified 51 papers for the review using a three-step methodology (Figure 1).

Step 1: We did an initial search for academic papers having the keywords “dynamic tariffs,” “dynamic electricity tariffs,” “dynamic electricity pricing,” and “time of use tariffs,” among others, in their titles using Google Scholar. We limited our search to papers published in English in 2013-2023. We extracted 526 papers with the keywords in their title using the ‘Publish or Perish’ software [8] and removed 74 duplicate records.

Step 2: We retained papers from journals published by Elsevier, Springer, Wiley, SAGE, and MDPI to focus on high-quality, full-text published papers. We did two rounds of screening on this filtered set of articles. In the first screening, we included abstracts that indicated a clear focus on implementing rather than designing dynamic tariffs for residential consumers. Papers that focused on dynamic tariffs in the wholesale market were excluded. In the second round, we categorized studies based on the aspect of implementing dynamic tariffs that they focused on. This strategy yielded 62 papers for the full-text review relevant to our research question.

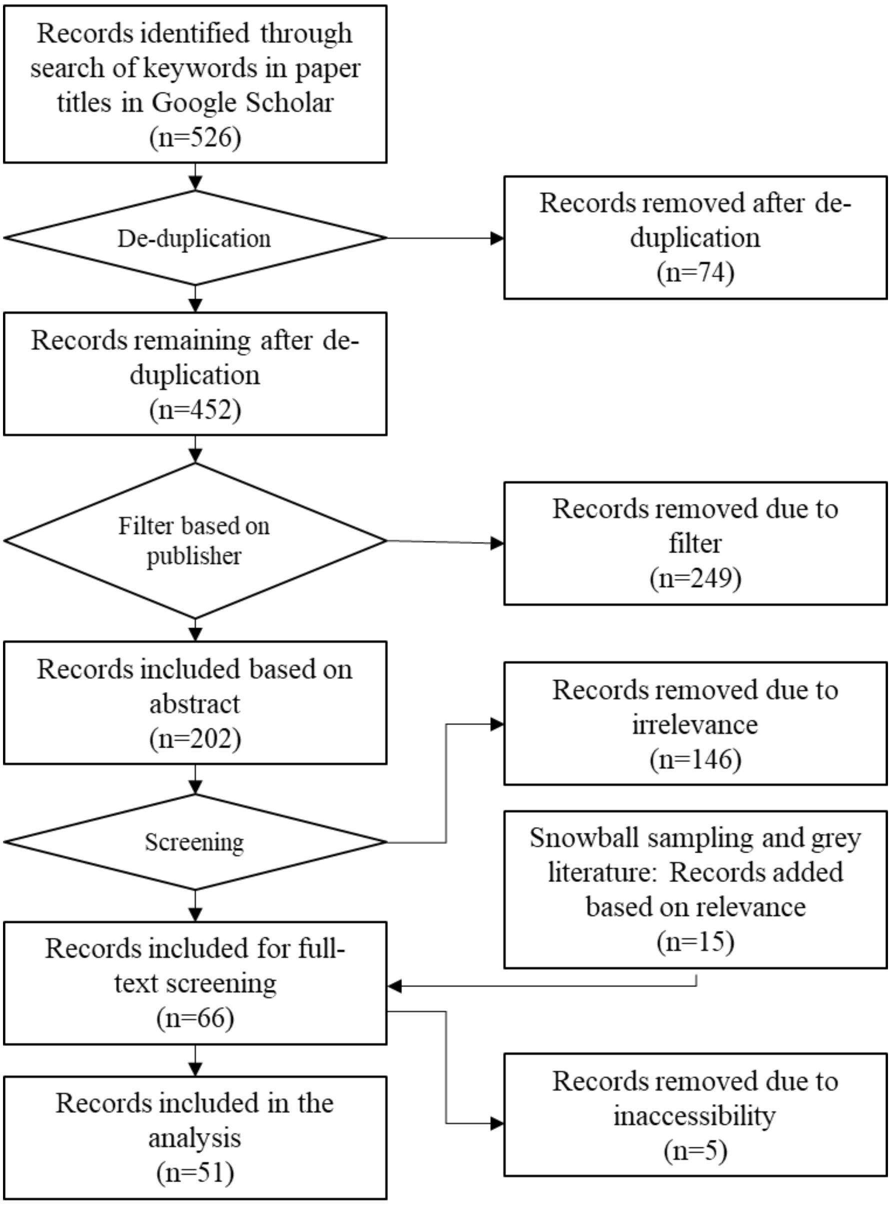

Figure 1: Methodology followed to identify papers for review

Step 3: We cross-checked our results with the database of the selected publishers and added the papers that were missed during the Google Scholar search due to the limitations of relying on Google Scholar alone. For example, Google Scholar shows only the first 1000 results and may return different results based on the timing of the search, limiting the search's reproducibility. We could not access five papers and added 15 papers obtained through snowball sampling, such as through the "related articles" option on Google Scholar, by referring to the citations of the selected papers, and by including relevant grey literature on India (see next section). We excluded papers that were found to be irrelevant during the full-text review from the final review.

Results

Geographical spread of empirical studies

Figure 2 shows the geographical spread of a sub-sample of reviewed papers based on field experiments, pilots, or modelling studies that use consumer data from a specific country. It excludes meta-analyses and literature reviews to avoid double counting and purely theoretical agent-based modelling studies. The geographical spread provides clues about the dominant sources of empirical data in the literature and the applicability of findings to Indian consumers.

Almost 40% of the included empirical studies are from Europe and North America. This may be because of the easier availability of consumer data from smart meters in the USA and European countries and a longer history of offering dynamic tariffs to retail consumers than in other regions [9]–[11]. Using English as the publication language as an inclusion criterion may have also affected the distribution across regions. Among Asian countries, Japan figures prominently in the literature, followed by India, China, and Korea. The validity of findings from studies based in developed countries in the Indian context needs to be carefully examined.

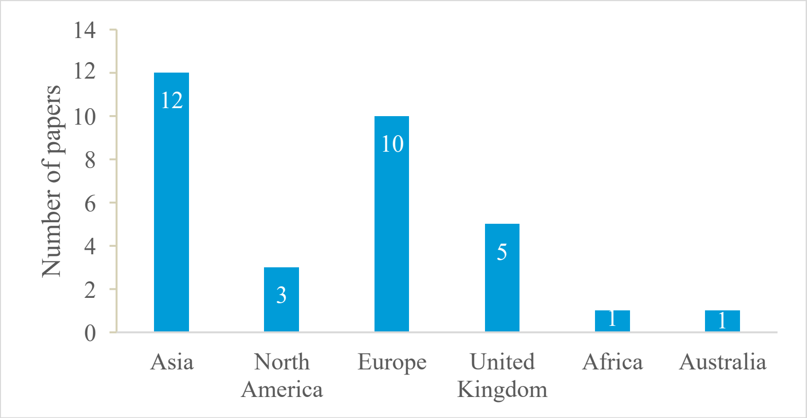

Figure 2: Geographical spread of included empirical studies.

Sparse literature on implementing dynamic tariffs in India

Academic literature from or based on India is sparse, with only four papers included in our review [12]–[15]. A simulation study [12] finds that a three-tier ToD tariff with net metering/feed-in tariffs could lead to zero cost of energy due to demand shift and the earning opportunity from selling energy to the grid. While the study finds a strong economic case for solar rooftop systems for residential consumers with ToD tariffs and net metering, it does not evaluate the impact of ToD tariffs on the economic case for solar rooftop systems by drawing a comparison with flat-rate tariffs. The study [13] conducted an experiment to assess the impact of dynamic pricing on off-grid solar systems and found that when electricity demand is low relative to the available supply, dynamic pricing would not be necessary and would not have the desired impact. Therefore, dynamic pricing for consumers who have higher peak demand would be more effective. The study [14] uses a discrete choice experiment to find that high-income consumers' willingness-to-adopt (WTA) a three-tier ToD is higher than for RTP and that environmental benefits are weaker decision influencers than bill savings and enhanced supply reliability. Finally, The study [15] is an interesting example of how discoms can optimize tariff structures for profit by forecasting consumer behaviour under a large number of potential tariff structures using advanced computational techniques.

Given the sparse academic literature in the Indian context, we also included grey literature in our search and found four more results [16]–[19]. The study [16] is an early report that explores the considerations in designing ToD tariffs and assumes that consumers would exhibit cost-minimizing behaviour under time-varying tariffs. However, a more recent survey of consumers in the study [19] shows that most consumers across categories declined to change consumption behaviour even if lower electricity rates were offered, indicating that cost minimization behaviour should not be assumed. Based on a review of 17 pilot projects globally, the study [17] recommended implementing pilots among consumers with homogenous consumption patterns to gather more information on the benefits and the required infrastructure. Similarly, based on a review of 82 papers, the study [18] stressed the importance of understanding the demand-price relationship and customer segmentation for implementing dynamic tariffs. However, it does not discuss how these variables impact consumer response to dynamic tariffs. Overall, the studies [17]–[19] reiterate the importance of enabling technology and the need for consumers to change their electricity consumption pattern but do not explore it in depth.

Methods used

Based on the review of the included studies, four important themes emerge for implementing dynamic tariffs for domestic consumers. The review documents the various methods and data that can be used to investigate questions related to these themes. Literature reviews on dynamic pricing have previously taken stock of developments and learnings as new technologies are deployed and more data becomes available. Choice experiments are a popular method to estimate consumers' WTA, preferences between types of dynamic tariffs, and the factors that influence these preferences. Pilots, experiments, and historical load data help to estimate or forecast how consumers change their behaviour in response to time-varying price signals. Algorithmic techniques, simulation studies, linear/mixed programming, and optimization models have been used to determine optimal schedules for loads, the information that can nudge consumers to shift loads, barriers to moving loads, and impact on bills.

Qualitative techniques such as interviews, surveys, and focus group discussions aid in identifying consumers' habits, practices, and lifestyles that influence their perceived ease of responding to dynamic tariffs and, therefore, the WTA and potential for load-shifting. Time use surveys comprise data on energy-related habits of households, including leisure, laundry, cooking, ironing, cleaning, etc., along with socio-demographic characteristics of households like occupancy, overall income, household type, employment status, etc. Table 2 presents these themes, the papers that address them, and the methods used.

Table 2: Methodologies used in the reviewed articles

Theme	Papers	Methods used
Segmentation of consumers and distributional effects	[12], [13], [20], [21], [22], [23], [24], [25], [26], [27], [28], [29], [30], [31], [32], [33], [34]	• Surveys, FGDs, simulation trials • Field experiment and/or statistical analysis on historical consumption data • Based on historical load data and time-use surveys • Sequence network analysis • Cost optimization through mixed linear integer programming • Analysis of tariff design through models calibrated using consumption data • Systematic review
Willingness-to-adopt	[14], [29], [35], [36], [37], [22], [38], [39], [40], [41], [42], [43], [44], [45], [46]	• Open source LORETTA model • Partial equilibrium model • Survey, interviews, mixed methods • Modelling appliance control • Choice experiments • Based on historical load data • Consumer cost optimization problem coupled with load flow calculations • Systematic review
Closing the intention-action gap	[22], [23], [20], [29], [37], [44], [47], [30], [48], [49], [50], [51], [52], [53], [54], [55]	• Survey and interviews • Statistical analysis of historical consumption data • Mixed integer linear or nonlinear programming • Choice experiments • Agent-based modelling/simulation • Modelling of appliance control • Deep Learning-based bi-level hybrid demand modelling framework • Systematic review
Consumer response to dynamic tariffs	[15], [22], [44], [34], [56], [57], [58], [59], [60]	• Survey and interviews • Permutation equivariance-enabled attention mechanism • Agent-based modelling/simulation • Field experiment and/or statistical analysis on historical consumption data • Utility functions of households to study subsistence during different hours

Important factors for implementing dynamic tariffs

Based on the literature, we divide each of the identified themes into factors that affect the implementation and uptake of and consumer response to dynamic tariffs.

Consumer segmentation and distributional effects

From an operational perspective, segmenting residential consumers is an important preliminary step to identify consumer groups that are likely to be able to shift load in response to price signals. From an economic perspective, segmentation helps estimate how a given dynamic tariff design would impact different kinds of consumers within the utility consumer base. The factors in this theme represent the *ex-ante* information about the consumer base used in the literature for segmentation and estimating distribution effects.

Income: Consumers across income levels are likely to be impacted by dynamic tariffs differently. For example, the study [21] found that a uniform ToU applied across the UK is expected to benefit high-income consumers in the urban area of London and low-income consumers in rural North East England due to divergent lifestyles. Consumers in poorer socio-economic areas respond less to different peak and off-peak prices [25], [31], which can result in an unfavourable perception of peak pricing by these consumers [38].

Education: Higher education levels positively correlate with the willingness to switch [23], [25], [40]. Beyond general education levels, the studies [30] and [32] find that consumers with lower levels of energy literacy do not opt for dynamic tariffs as they fail to understand their potential benefits. Energy literacy comprises the capacity to read and understand electricity bills and the extent of understanding the electricity market.

Household composition: Shifting energy use is likely to be more difficult for households with multiple members, households with children, and consumers with an inherent inflexibility in their tasks, such as child care or elder care [22], [26], [34], [44], [61]. These consumers would demonstrate a greater unwillingness or inability to shift their consumption across hours a day and could be disadvantaged by dynamic tariffs.

Grid characteristics and objectives: Depending upon the elasticity of consumption and rate of penetration of decentralized energy sources such as rooftop solar systems, the impact of dynamic tariffs on overall economic efficiency may vary [28]. Tariffs determine how consumers who own decentralized energy sources bear capacity, energy, and network charges versus those who do not. Therefore, the tariff design may vary depending on the utilities' objectives of promoting or limiting the uptake of decentralized energy.

Consumers' WTA dynamic tariffs

Even without wide adoption by consumers, dynamic tariffs can improve grid utilization, leading to a reduced need for grid expansion [46]. However, not adopting dynamic tariffs results in unrealized welfare gains [35] or increased tariffs for residential consumers in the long run [36]. A granular understanding of the reasons for not adopting dynamic tariffs can help chart a strategy to enhance adoption.

Tariff design: The choice between ToD, RTP, and CPP can affect consumers' decision to switch to a dynamic tariff. The study [20] found that the uptake of RTP across a sample of developed countries is 13% lower than ToU tariffs. Studies in Germany, Sweden, and the UK reveal a lower consumer preference for CPP and RTP than ToU [37], [41], [62]. In the Indian context, the study [14] also found a low preference for RTP in high-income households in Delhi. This is partly because dynamic tariffs are more complex than flat rate tariffs, adding to an individual's cognitive burden and decreasing their WTA [41], [48]. Some studies also report consumer preference for a three-tier tariff over a two-tier tariff [14], [20], [22].

Awareness: Higher awareness about the benefits of adopting dynamic tariffs can increase WTA. The expected reduction in power outages is a positive motivator for high-income Indian consumers to opt for time-varying tariffs even at a higher cost [14]. Positive environmental benefits**,** such as reductions in carbon emission at the system level, may effectively increase WTA among some consumers, even if it means diminished monetary benefits [43], [63].

Loss aversion: Loss aversion is when downward deviations from a reference point (mostly the status quo) are given a higher weightage than potential upward deviations [64]. A higher risk of bill increase or perception of loss in comfort results in a heightened tendency to maintain the status quo, i.e., not adopting a new tariff. 93% of billpayers were found to be loss-averse in a nationally representative sample survey of 2020 British energy billpayers [40].

Familiarisation: Given the factors discussed above, trials or pilots can aid in making consumers feel more confident about changing their energy consumption practices [44]. Providing incentives during pilots can drive energy-saving habit formation [57]. The importance of familiarisation is demonstrated by the fact that consumers in the UK who are already on two-tier ToU tariffs have a greater willingness to switch to other time-varying tariffs [29], [40].

Gap between willingness and action

A meta-analysis in the study [20] found that the median share of domestic consumers who expressed willingness to sign up for dynamic tariffs was five times higher than the median actual sign-up rates across studies. Therefore, despite expressing willingness to adopt a new tariff, obtaining a high uptake rate requires further interventions.

Decision lead time: An agent-based model in the study [51] showed that if more time elapses between consumers becoming aware of a new tariff and deciding to adopt it, the gap between willingness and adoption rates increases due to the action of other personnel, local and global factors such as feedback from peers and advertising. The model in the study [51] also shows that adoption of new tariffs is initially likely to happen in small clusters, which are essential to form a momentum for broader adoption. Thus, following a proposal of tariff change, reinforcement of the positive aspects of the new tariff would be required so that a positive opinion of the new tariff is sustained.

Switching mechanism: Utilities need to make a rollout decision of whether to keep the program as 'opt-in' or 'opt-out.' In implementation trials in various countries, opt-in recruitment led to uptake levels as low as 1% without any efforts on consumer engagement; uptake was higher (43%) with concerted efforts on awareness, promoting assistive technologies such as smart meters and thermostats, etc. [20]. In the case of an opt-out mechanism where a tariff becomes the default option, recruitment is likely to exceed 57% and go up to 100% [20].

Access to technologies: In case of multiple tariff options to select from, consumers may struggle to match tariffs to their electricity usage, resulting in sub-optimal decisions. Providing an easy-to-use digital tool that compares flat-rate and time-varying tariffs helps consumers make more informed choices [29], [48].

Consumer response under dynamic tariffs

Several dynamic tariff pilots observed peak demand reduction in the range of 13-35%, with higher reduction levels where enabling technology was provided [17]. ToU can also lead to a reduction in wholesale market prices if consumers respond. On average, with a 5% reduction in consumption by consumers during the base and peak tariff periods, retailers could reduce the energy price by 1.5%, increasing retailers' returns and lowering consumer tariffs [56]. Notwithstanding, there are limits to price-responsiveness by shifting activities from peak to off-peak periods for households, as the subsistence levels may be higher during the peak and need to be met regardless of the electricity price [60].

Appliance and dwelling characteristics: Actual response to price is higher for households with more appliances, more flexible appliances, and better-insulated houses that can maintain indoor temperatures without active energy use for longer [61]. Consumers that own energy-efficient appliances [25], electric vehicles [29], [40], [65], and flexible space conditioning devices like heat pumps with thermal storage [24] may be able to provide a steeper response to time-varying tariffs and save on their electricity bills. The evidence on ownership of solar rooftop systems is mixed. While the study [12] finds that solar rooftop systems are economic under ToD if demand is shifted to lower price periods, the study [31] does not observe any impact of solar photovoltaics' ownership on the difference between peak and off-peak consumption.

Access to information: The availability of timely and actionable information determines the extent of consumer response to tariffs. Real-time feedback on in-home displays with colour signals to indicate peak hours or display the electricity intensity of appliances is useful in the short run [30], [37], [44]. Reports that indicate the level of consumption relative to peers can prompt consumers to shift tasks in response to electricity tariffs [22]. Information assisting recall can also help. For example, suppose consumers recall that prices during peak hours are higher than the previous day. In that case, the reduction in energy consumption is greater than when prices are lower than the previous day [39]. Therefore, even after post-consumer enrolment, utilities must empower consumers to respond to tariffs by sharing relevant information.

Appliance automation and smart meters: Scheduling appliances help reduce the cognitive burden on consumers to shift demand and help achieve bill savings [27]. Appliances can be scheduled to meet objectives like minimizing peak load, minimizing bills, or ensuring thermal comfort [50], [53]. Home energy management systems or appliances like dynamic thermostats can help schedule appliances based on the nature of tasks and individual routines [49], [54]. Electricity suppliers can also use automation algorithms to account for consumer behaviour and offer optimal day-ahead prices [55]. In this context, smart meters are a critical technology. The study [34] demonstrates that smart meter data can be leveraged to predict load profiles based on historical load data, which can help design optimal prices. Table 3 summarises the themes and indicators extracted from the literature.

Table 3: Factors impacting the implementation of dynamic tariffs

Consumer segmentation and distributional effects	Consumer WTA	Intention-action gap	Consumer response
1. Income 2. Education 3. Household composition 4. Grid characteristics and objectives	1. Tariff design 2. Awareness of benefits 3. Loss aversion 4. Familiarisation	1. Decision lead time 2. Switching mechanism 3. Access to enabling technologies	1. Appliance and dwelling characteristics 2. Access to information 3. Automation and smart meters

Discussion

Each theme in Table 2 represents an important aspect of the effective implementation of dynamic tariffs, and each factor provides the information required to understand how it impacts implementation. It is obvious that some information should precede subsequent implementation steps. For example, utilities must determine the consumer category that can provide a price response before deciding on the switching mechanism to offer. Thus, we arrange the themes in a chronological sequence to propose a three-stage implementation framework for dynamic tariffs (Figure 3): (1) **Design** the tariff based on consumer segmentation, an assessment of distributional impacts, and consumers' WTA, (2) **Rollout** the designed tariff following consumer engagement and pilots using an appropriate switching mechanism, and (3) **Sustain** impact by improving tariff offerings and consumer empowerment through technology.

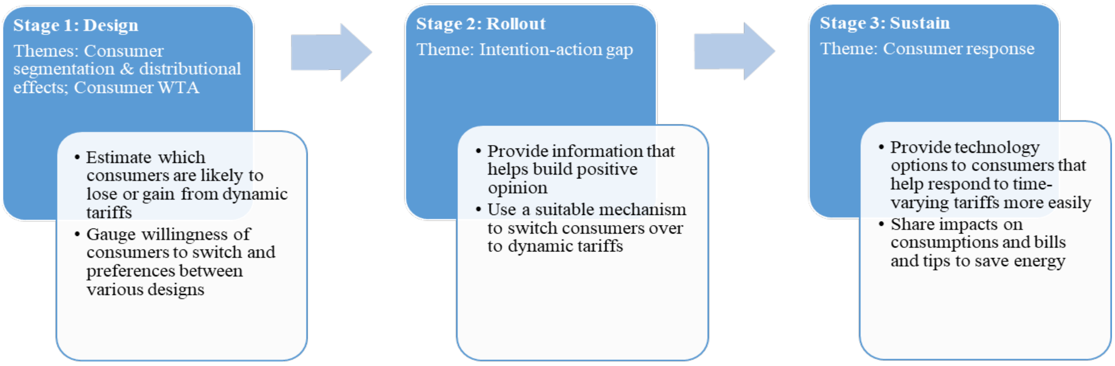

Figure 3: Three-stage implementation framework for residential dynamic tariffs

Stage 1: Design

In the first stage, discoms must determine the objective of implementing dynamic retail tariffs, the consumers to be targeted, and the appropriate tariff design. For example, is the objective to shift the load from peak hours to other hours on a regular basis or only to contain demand during extreme supply shortages? What are the policy targets for promoting the adoption of solar rooftop units or EVs? Accordingly, discoms must segment the consumer base for targeting and choose the appropriate tariff design. For example, which consumers primarily drive the peak demand and would change consumption behaviour under a ToD or CPP tariff? Or which consumers are expected to adopt solar rooftop units or EVs, and what price signals do they require to do so? Load research studies are critical to determine system-level objectives and carry out consumer segmentation. Demand-side data such as hourly load profiles, sanctioned load, and billing demand can be used to identify seasonal and daily peaks and the consumers driving the peak. This must be combined with supply-side data on the power supply position and costs to estimate the appropriate tariffs for cost recovery [66], [67].

Once a suitable tariff type is chosen and cost-reflective prices are estimated, discoms should map its potential impacts on the consumer base. Consequences may vary based on the characteristics of its consumer base, such as income and education levels, family sizes and habits, weather across its control area, etc. Expected gains and losses and consumers' perception of them are essential in communicating with consumers and getting their buy-in.

While existing consumption slabs and data may help in the segmentation process, discoms may have to overlay information from other sources, such as time-use surveys, to design the finer features of tariffs, for example, the number of tiers in a ToD tariff. Time-use surveys can help generate synthetic demand profiles of various types of consumers, map the impact of electricity prices, and identify the activities that need to be shifted or reduced to respond to time-varying tariffs. Forty countries have carried out time-use surveys at a national scale [68], including India [69]. Consumer's WTA has to be determined to estimate the likelihood of consumer uptake of dynamic tariffs. Information obtained during segmentation can help design samples for a WTA exercise, such as through choice experiments. Estimating WTA would also provide critical insights into consumers' perceptions of dynamic tariffs. For example, do consumers prefer a two- or three-tier ToD, or is CPP perceived to be more complex and riskier than ToD due to loss aversion? Finally, discoms may have to conduct pilots among homogenous consumer groups to collect detailed information on the effectiveness of tariff designs and increase consumers' familiarity with time-varying tariffs.

Stage 2: Rollout

Based on the information gathered for design, discoms should focus on consumer engagement since high WTA for dynamic tariffs may not translate into high recruitment rates. Engagement should help consumers form and sustain a positive opinion about the proposed tariff design by assisting them in understanding it and communicating its potential benefits. Information about the characteristics of the consumer base gathered during stage 1 can help design engagement strategies, which can be tailored for the different consumer segments and emphasize various benefits, such as bill savings, environmental benefits, reduced power outages, etc. Pilot projects can be used to familiarise consumers with the new tariff. The option to switch to the new tariff should follow at a time such that enough consumers have formed a positive opinion about the new tariff. The switching needs to manage the trade-off in making the process easier for consumers and garnering wider consumer acceptance. Once a few clusters of uptake are formed, social comparisons, such as through home energy reports [70], can be used to facilitate wider uptake. The dissipation of reliable and helpful information about the tariff is even more important in cases where consumers distrust the discom due to unreliable power supply [71].

Stage 3: Sustain

The final stage is ensuring demand response via continuous engagement and leveraging technologies. Consumers who already own energy-efficient appliances, EVs, and better-insulated homes are likely to modulate demand in response to price signals. Consumer engagement in this stage should focus on providing tips and strategies to consumers that can help them use these assets to benefit from dynamic tariffs. Response strategies include 'recrafting' how practices are done to reduce their energy intensity, like using gas for cooking during peak hours instead of electricity, 'substituting' unsustainable practices with more sustainable ones, like using a thermos to keep tea hot, and 'changing how practices interlock' or changing practice sequencing through automation [59], [72]. Technologies that provide feedback, such as in-home displays and digital comparison tools, also enable consumers to respond to dynamic tariffs comfortably and should form the focus of subsequent DSM strategies by discoms.

Conclusion

This paper has provided a three-stage framework for a sustainable and effective implementation of dynamic tariffs for residential consumers. Since residential consumers are not a homogenous category, a deeper understanding of the willingness of consumers to adopt dynamic tariffs and their impacts on consumers is important. Regular and robust load research studies can help the discoms identify the appropriate tariff design. The proposed framework can help target the consumer segments that drive peak demand, make dynamic tariffs more palatable for consumers, and, where required, provide bill protection. Beyond installing smart meters, regulators and discoms need to understand consumer preferences and attitudes and cater to these via information and technology to ensure dynamic tariffs are acceptable.

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