

# UNDERSTANDING AND SIMULATING TNB'S 2025 NEW ELECTRICITY TARIFFS FOR DOMESTIC USE AND ITS IMPACT ON VULNERABLE DOMESTIC HOUSEHOLDS

MUHAMMAD SUKRI BIN RAMLI  
Kuala Lumpur, Malaysia  
Email: m.binramli@sloan.mit.edu

This report provides an in-depth analysis of Tenaga Nasional Berhad's (TNB) restructured electricity tariffs in Peninsular Malaysia, effective July 1, 2025. It specifically focuses on the domestic sector, covering the key changes in the tariff structure, explaining how a household's bill is calculated, and presenting simulations demonstrating the financial impact on different domestic household types, including the perceived benefits of shifting electricity consumption habits. To be fair, author acknowledge the figure and data derived for this report is 100% simulated and synthetic data for training purposes.

## 1. Introduction to the New Tariff Structure

Effective July 1, 2025, Tenaga Nasional Berhad (TNB) has implemented a new electricity tariff structure aimed at promoting energy-efficient practices. While this restructuring enhances transparency in billing, a critical analysis of the Time of Use (ToU) scheme reveals a significant potential disadvantage for vulnerable, stay-at-home groups. This report specifically analyzes how the new tariff structure, particularly the ToU scheme with its defined peak hours, may financially penalize households whose electricity consumption during these hours is a necessity rather than a choice. These vulnerable groups include retirees, parents with small children, work-from-home professionals, and those caring for the sick.

## 2. Key Changes in TNB Tariff Structure Affecting Domestic Users

The core principles guiding this restructuring are fairness, transparency, and affordability for residential customers. Several significant changes have been introduced. Firstly, electricity bills for households will now feature a clearer breakdown of costs associated with electricity generation and transmission. This includes the Automatic Fuel Cost Adjustment (AFA) mechanism, which will be updated monthly to reflect current market fuel prices and foreign exchange rates, and is set at 0.00 sen/kWh for July 2025. Secondly, the tariff system for domestic customers is transitioning from an activity-based structure to a voltage-based one. This means a simplification from five previous tariff blocks to just two, making it easier for homeowners to understand their rates. Thirdly, the Time of Use (ToU) Scheme has been significantly improved and expanded, extending off-peak hours to cover all day on Saturdays and Sundays, and from 10:00 PM to 2:00 PM (next day) on weekdays. This expanded scheme is now accessible to Low Voltage Domestic customers equipped with Smart Meters or Current Transformer (CT) Operated Meters/Remote Meter Reading (RMR), offering households greater flexibility. Lastly, new Energy Efficiency Incentives are being introduced to encourage energy savings among specific domestic consumer groups, while existing rebates for eligible social institutions and eKasih recipients will be maintained.

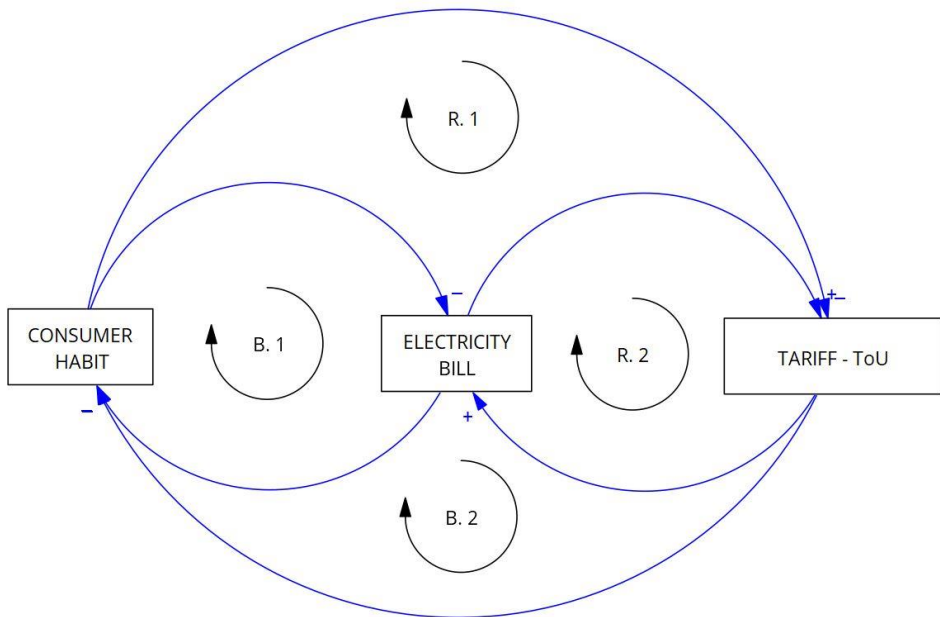
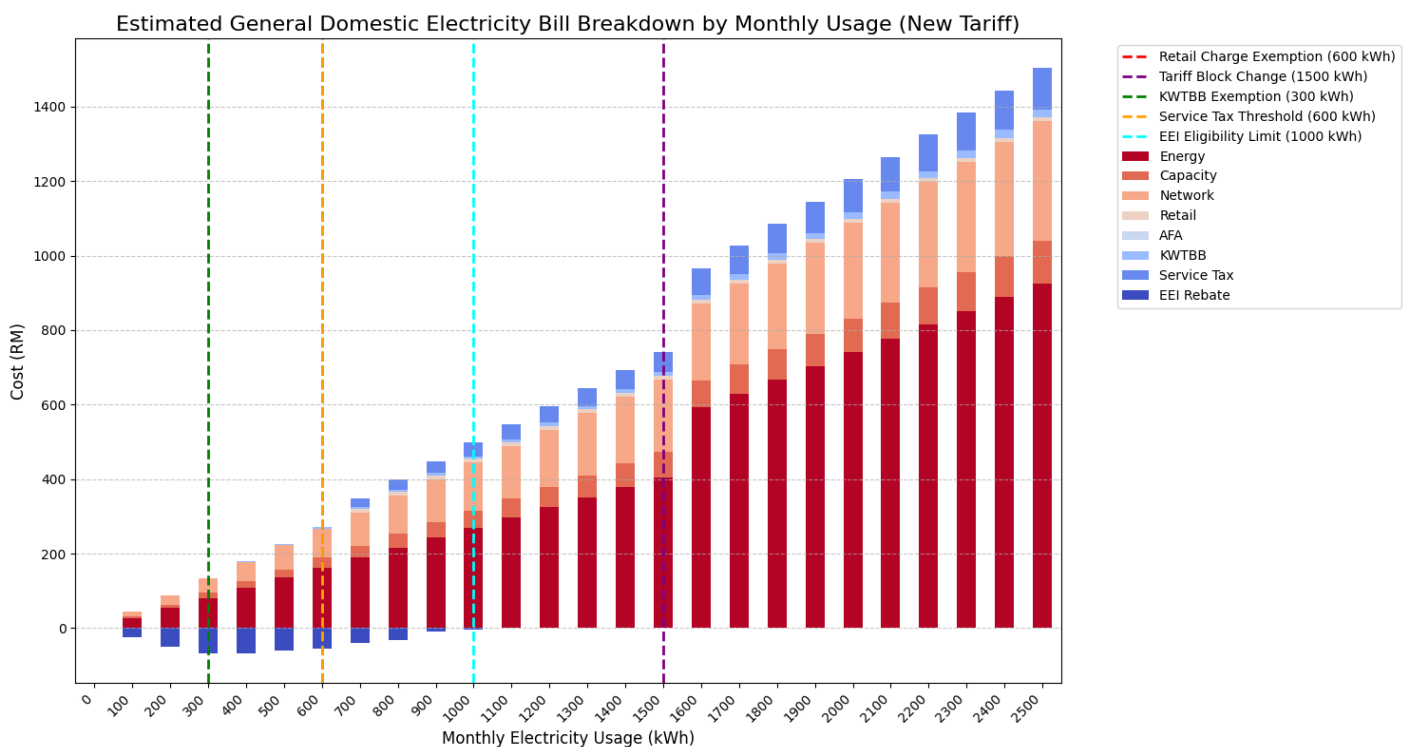


Figure 1: Causal Loop Diagram of Household Electricity Bill Dynamics under ToU Tariff

This causal loop diagram illustrates the dynamic interplay between **Consumer Habit**, **Electricity Bill**, and the **TARIFF - ToU** (Time of Use), presenting four distinct feedback loops. The diagram includes two **Balancing Loops (B.1 and B.2)**, which represent self-correcting mechanisms where changes in one variable trigger responses that push the system back towards an equilibrium. For instance, a higher Electricity Bill (B.1) might motivate consumers to change their habits to reduce costs, while the interaction between the Electricity Bill and the ToU Tariff (B.2) could also lead to stabilization. Conversely, the diagram also shows two **Reinforcing Loops (R.1 and R.2)**, which indicate self-amplifying cycles where changes in one variable lead to further changes in the same direction, potentially driving the system towards continuous growth or decline. For example, R.1 suggests that if consumer habits lead to a higher Electricity Bill, the increased impact of the ToU Tariff might, counter-intuitively, reinforce those very habits, leading to a continuous rise in the Electricity Bill. R.2 also represents a reinforcing dynamic between the Electricity Bill and the ToU Tariff. This comprehensive set of loops highlights the complex feedback mechanisms that influence electricity consumption and billing under the new ToU tariff structure.

### 3. Understanding Household Electricity Bill Components

Consumer restructured household electricity bill will clearly itemize costs into three primary components: Generation Cost, Network Charge, and Retail Charge. The Generation Cost covers the expenses of electricity generation, encompassing the Energy Charge (cost of fuel), the Automatic Fuel Cost Adjustment (AFA), and the Capacity Charge (payments under Power Purchase Agreements and Service Level Agreements). The Network Charge accounts for the operational costs of transmitting and distributing electricity to your home, including infrastructure maintenance and upgrades. Finally, the Retail Charge covers customer service, billing, and account management specifically for residential accounts. In addition to these primary components, other charges pertinent to domestic users include the Renewable Energy Fund (KWTBB) Charge, a 1.6% levy applied to all customers except domestic users consuming 300 kWh or less per month, and an 8% Service Tax, which is applied only to domestic customers whose monthly consumption exceeds 600 kWh.

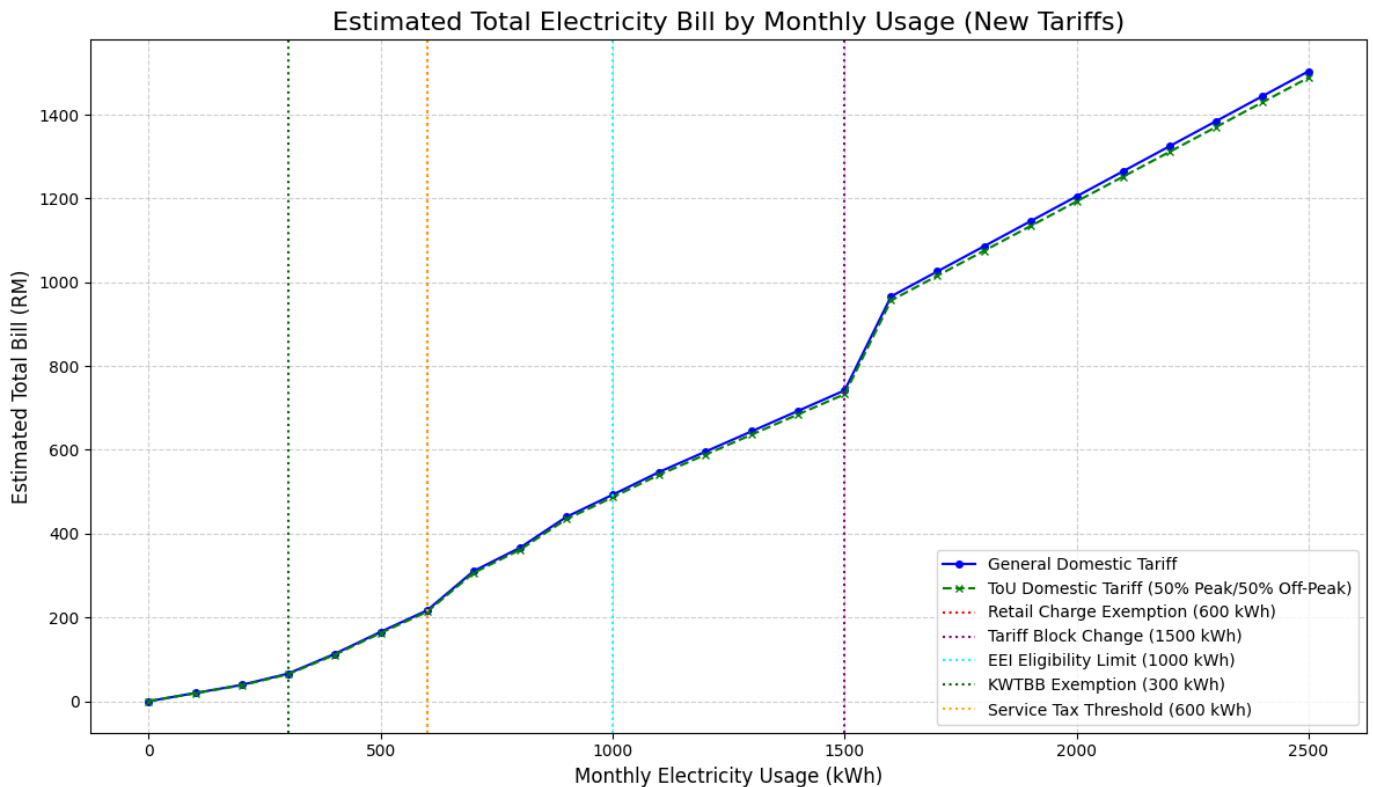


**Figure 2: Estimated General Domestic Electricity Bill Breakdown by Monthly Usage (New Tariff)**

*Description: This stacked bar chart provides a detailed breakdown of the estimated monthly electricity bill for domestic customers under the General Domestic Tariff. Each bar represents a specific monthly electricity usage (in kWh), and the stacked segments show the contribution of different cost components: Energy, Capacity, Network, Retail, AFA, KWTBB, Service Tax, and EEI Rebate (which appears as a negative value, reducing the total bill). Vertical dashed lines highlight important thresholds such as retail charge exemption (600 kWh), tariff block change (1500 kWh), KWTBB exemption (300 kWh), service tax threshold (600 kWh), and EEI eligibility limit (1000 kWh), offering a clear visualization of how each element influences the overall bill at different consumption levels.*

#### 4. New Domestic Tariff Rates (Effective July 1, 2025)

The domestic tariffs are structured into two main categories: General Domestic Tariff and Time of Use (ToU) Domestic Tariff. Under the General Domestic Tariff, for usage up to 1,500 kWh per month, the Energy Charge is 27.03 sen/kWh, Capacity Charge is 4.55 sen/kWh, Network Charge is 12.85 sen/kWh, and a monthly Retail Charge of RM10.00 applies, though this is exempted if usage is 600 kWh or less per month. For usage exceeding 1,500 kWh per month, the Energy Charge increases to 37.03 sen/kWh, while Capacity, Network, and Retail Charges remain the same. The Time of Use (ToU) Domestic Tariff introduces differentiated rates based on time of day, designed to benefit households that can shift their consumption. For usage up to 1,500 kWh per month, the Peak Energy Charge is 28.52 sen/kWh and the Off-Peak Energy Charge is 24.43 sen/kWh; Capacity, Network, and Retail Charges are consistent with the General Tariff, with the same retail charge exemption. For usage above 1,500 kWh per month under ToU, the Peak Energy Charge is 38.52 sen/kWh and the Off-Peak Energy Charge is 34.43 sen/kWh, with other charges remaining constant. Furthermore, Domestic customers consuming between 1 kWh and 1,000 kWh per month are eligible for Energy Efficiency Incentives (EEI), which provide rebates that are higher for lower consumption tiers (e.g., -25.0 sen/kWh for 1-200 kWh, gradually decreasing as consumption increases).

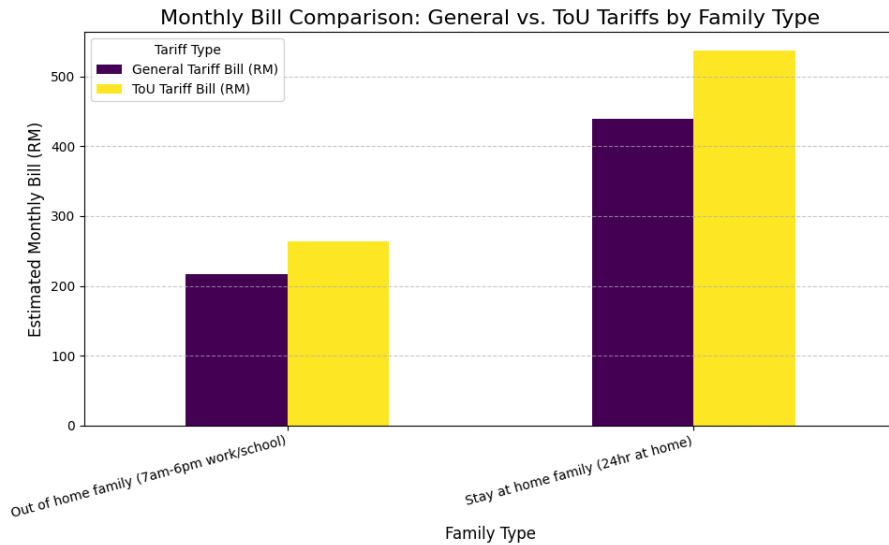


**Figure 3: Estimated Total Electricity Bill by Monthly Usage (New Tariffs)**

*Description: This line graph illustrates the estimated total monthly electricity bill for domestic customers under both the General Domestic Tariff and the Time of Use (ToU) Domestic Tariff (assuming a 50% peak/off-peak split). It shows how the total bill changes with increasing monthly electricity consumption (in kWh). Vertical dashed lines indicate key thresholds for tariff block changes (1500 kWh), retail charge exemption (600 kWh), EEI eligibility limit (1000 kWh), KWTBB exemption (300 kWh), and service tax threshold (600 kWh), providing a comprehensive overview of the new tariff structure's impact across various usage levels.*

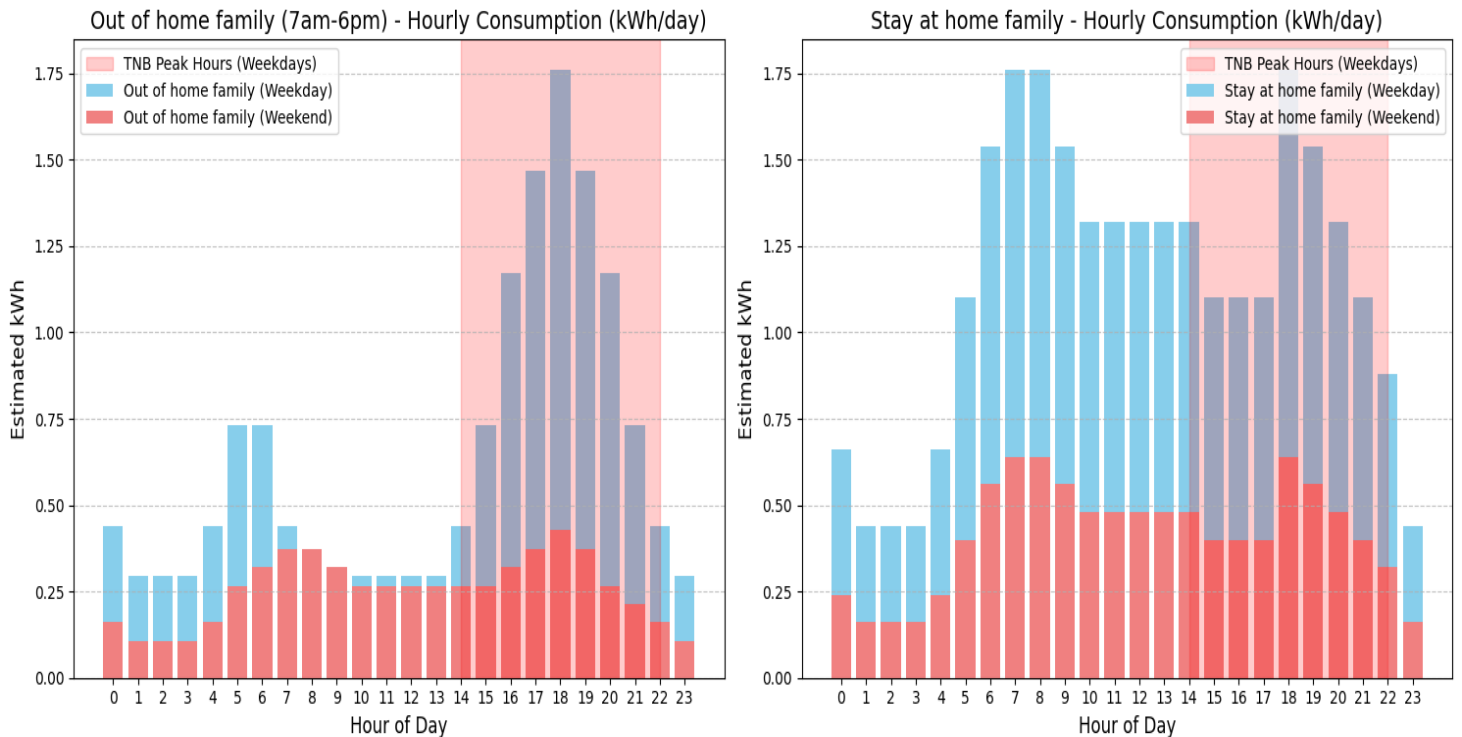
#### 5. Simulating Electricity Bills for Different Domestic Family Types

To understand the practical impact of the new tariffs on households, we simulated monthly electricity bills for two hypothetical domestic family types based on their average monthly consumption and typical daily usage patterns. These included an "Out of home family (7am-6pm work/school)" assumed to use an average of 600 kWh/month with lower weekday daytime consumption, and a "Stay at home family (24 hour at home)" assumed to use an average of 900 kWh/month with more consistent daytime consumption. The initial simulation results, based on their original habits, indicated varying bill amounts under both General and ToU tariffs, with the ToU tariff generally offering savings due to the proportion of consumption falling into off-peak hours. The detailed breakdown of these initial simulation results is presented in Figure 4: Initial Simulated Monthly Bills for Different Domestic Family Types. The underlying hourly consumption profiles, which illustrate the distribution of electricity usage throughout the day for each family type, highlighting weekday peak hours (2 PM - 10 PM) versus off-peak times, are visualized in Figure 5: Hourly Consumption Profiles (Original Habits) for Domestic Families.



**Figure 4: Initial Simulated Monthly Bills for Different Domestic Family Types (Assuming A 50% Peak/Off-Peak Split).**

This bar chart provides a visual comparison of the estimated monthly electricity bills under the General Domestic Tariff versus the ToU Domestic Tariff. It analyzes two distinct household profiles: the "Out of home family (7am-6pm work/school)" and the "Stay at home family (24 hour at home)," based on their original, unshifted consumption habits. The chart clearly demonstrates that for both family types, the ToU Tariff results in a higher estimated monthly bill compared to the General Tariff if no behavioral changes are made. This is particularly pronounced for the "Stay at home family," illustrating how the ToU scheme can initially lead to a significant financial increase for those with consistent, day-long energy needs. It effectively highlights the potential for an increased electricity bill when opting into the ToU tariff without active habit changes.



**Figure 5: Hourly Consumption Profiles (Original Habits) for Domestic Families**

Description: This figure should contain two bar charts, side-by-side. The first chart illustrates the typical hourly electricity consumption distribution for the "Out of home family" on weekdays and weekends, scaled by their average daily kWh. The second chart does the same for the "Stay at home family" family.

## 6. Impact of Shifting Habits for ToU Optimization in Households

The ToU tariff offers potential savings if **domestic consumers** can shift their electricity usage to off-peak hours when rates are lower. We simulated how the bills would change if both family types actively adopted habits to maximize off-peak consumption. The results of this simulation, comparing original versus shifted habits under the ToU tariff, demonstrated a clear financial benefit from behavioral changes. These comparative results are summarized in **Figure 7**. The visual impact of these behavioral changes on daily consumption patterns is further illustrated in **Figure 8**, which clearly demonstrates how usage can be moved out of expensive peak periods.

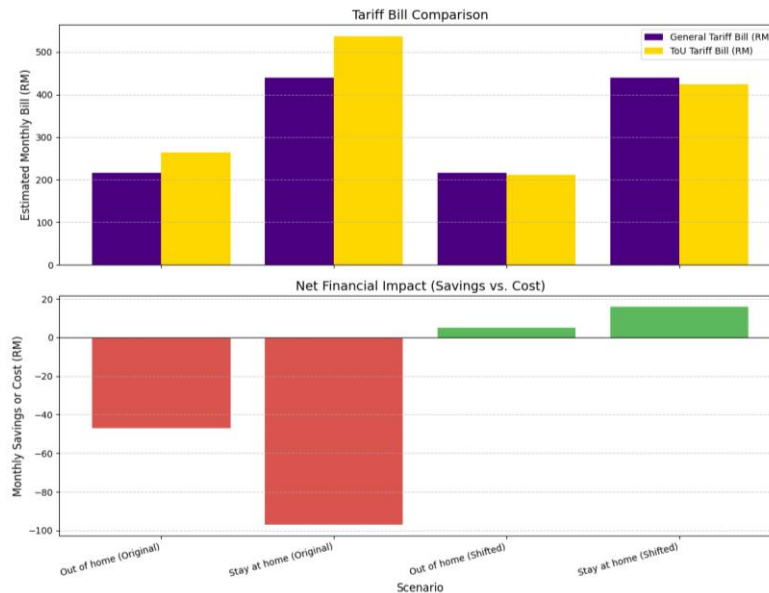
Family Type	Habit	Total Monthly kWh	General Tariff Bill (RM)	ToU Tariff Bill (RM)	ToU Peak %	ToU Off-Peak %	Potential ToU Savings (vs. General) (RM)
Out of home family (Original Habits)	Original	600	216.85	263.7	44.73	61.47	-46.86
Stay at home family (Original Habits)	Original	900	439.85	536.96	34.47	89.53	-97.11
Out of home family (Shifted Habits)	Shifted	600	216.85	211.75	43.14	56.86	5.09
Stay at home family (Shifted Habits)	Shifted	900	439.85	423.82	23.89	76.11	16.03

**Figure 6: Simulated Monthly Bills: Original vs. Shifted Habits for Domestic Users**

(Note: The ToU Peak % and ToU Off-Peak % for 'Shifted Habits' reflect a more optimized distribution of consumption to off-peak periods, demonstrating the effect of behavioral change.)

### Key Insights from Household Habit Shifting:

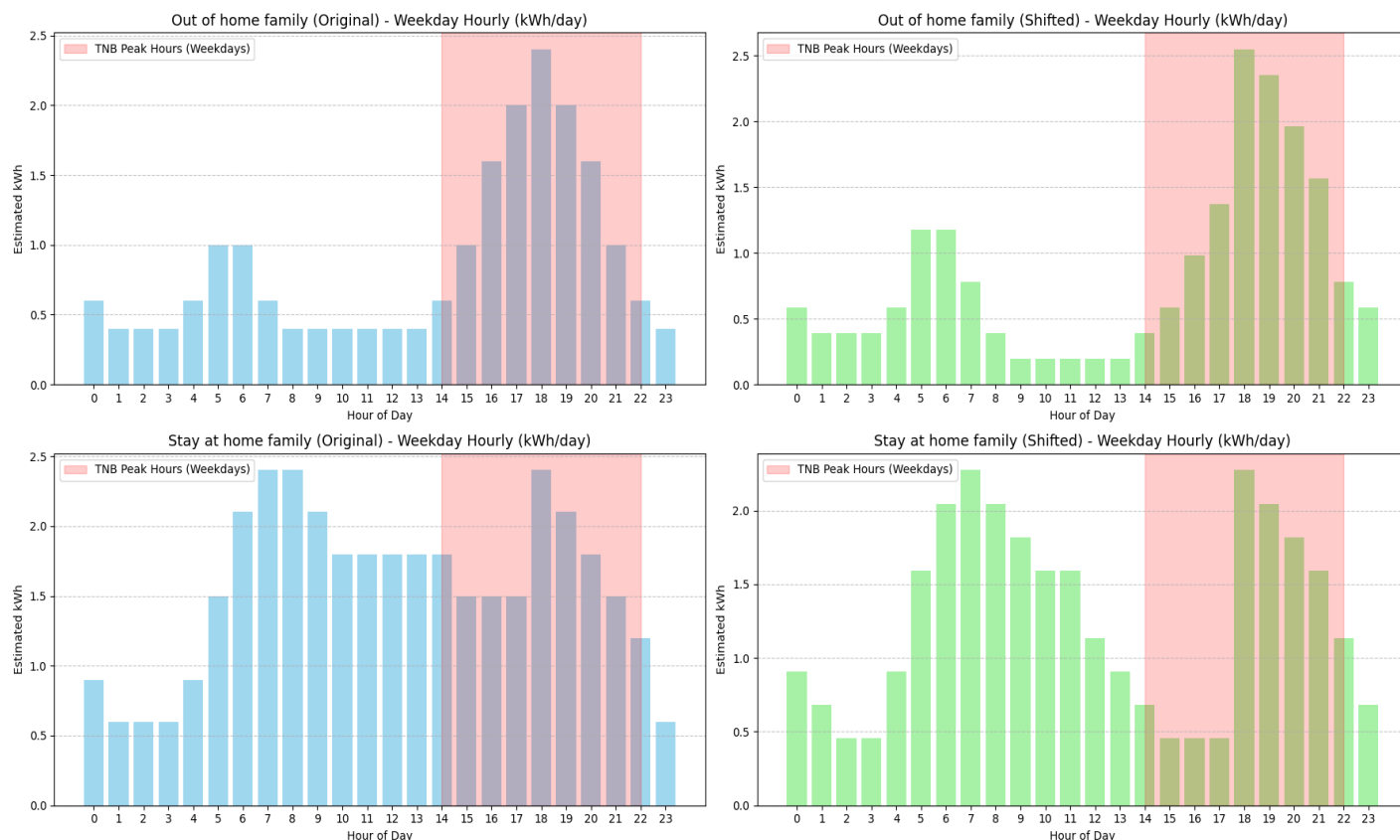
The Time of Use (ToU) tariff is presented as an opportunity for savings, contingent on the consumer's ability to shift electricity usage to off-peak hours when rates are lower. However, a critical analysis of the simulation results reveals that this structure may disproportionately penalize vulnerable "Stay at home" households, for whom shifting energy consumption is not a simple choice but a significant burden that can compromise well-being. The simulation compares bills for two family types, demonstrating the severe financial consequences of not being able to shift consumption patterns. While the "Out of home family" is less affected, the "Stay at home family" faces a different reality. With their original habits, this family faces a significant financial penalty, with their ToU bill simulated at RM 536.96 a cost increase of RM 97.11 compared to the General Tariff.



**Figure 7: Simulated Monthly Bills: Original vs. Shifted Habits for Domestic Users**

*Description: This bar chart directly compares the estimated monthly bill under the Time of Use (ToU) tariff for each domestic family type, showing both their 'Original' consumption habits and their 'Shifted' habits (where usage is moved to off-peak times).*

The simulation suggests that only by actively shifting habits can this family mitigate the penalty, lowering their bill to RM 423.82 to achieve a modest saving of just RM 16.03. The stark difference between a nearly RM 100 penalty and a RM 16 saving represents the immense financial pressure placed on these households to alter essential daily routines. This inadvertently highlights a penalty on essential lifestyles, as the higher initial ToU bill is a direct consequence of their need to use electricity at home during the day. The premise that households with higher peak-hour consumption have the "most to gain" is therefore flawed, as it overlooks that these are often the households with the least flexibility. For them, "shifting habits" is not an optimization but a compromise on essential needs. Ultimately, the model's requirement of "active management and shifting of energy-intensive activities" places an undue expectation on caregivers, the elderly, or work-from-home professionals, turning a supposed benefit into a source of potential increase in efforts.



**Figure 8: Visualizing Original vs. Shifted Hourly Consumption Profiles for Domestic Families**

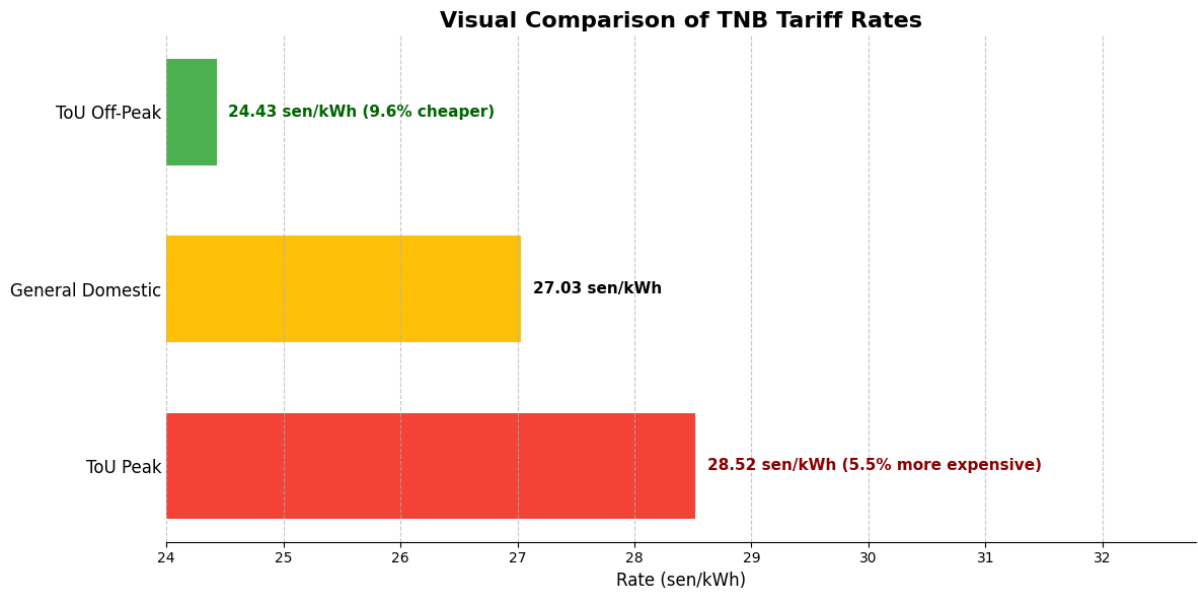
### 7. Conclusion & Recommendations for Domestic Consumers

The new TNB electricity tariff structure, while designed to promote energy efficiency, contains a structural flaw in its optional ToU scheme that disproportionately burdens vulnerable, stay-at-home groups, as the scheme's success hinges on a consumer's ability to shift usage a flexibility many in this demographic do not possess. Based on this critical analysis, it is imperative for vulnerable households with smart meters to critically analyze their non-discretionary, essential electricity usage. Tools like the myTNB app should be utilized for this assessment, helping homeowners make an informed decision rather than purely serving as a tool to force a lifestyle change. If a significant portion of essential usage falls within the 2 PM to 10 PM weekday peak hours, the General Domestic Tariff may be a more financially stable option, even if it appears more expensive at first glance. Furthermore, policymakers and TNB should review the impact of the ToU tariff on these specific demographics, as existing rebates for eKasih recipients, while vital, may not cover the full spectrum of vulnerable households. Consideration should be given to alternative tariff structures or additional safeguards for those with medically or situationally necessary high peak-hour consumption. By focusing solely on the potential for savings through behavioral change, the current ToU model overlooks the segment of the population for whom such changes are not a choice. A truly fair and equitable tariff structure must account for the realities of all its consumers.

### Reference

Tenaga Nasional Berhad. (n.d.). *Tariff: Bill calculator*. myTNB. Retrieved July 4, 2025, from <https://www.mytnb.com.my/tariff/index.html?v=1.1.8#calculator>

**Appendix**



**Figure 9: Relative Cost of Time of Use (ToU) Rates vs. the General Domestic Tariff.**