InterFlex

Unlocking the barriers to accelerate and scale up residential flexibility in Belgium

Compound market signals

Consumption Profiles and Switching Incentives under Dynamic Electricity Pricing: Evidence from Belgian Smart Meter Data

Work Package 1 – Task 1.1 – Deliverable 1.1.2

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InterFlex D1.1.2: Compound Market Signals

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Executive Summary

This report analyses how different residential electricity consumption profiles interact with dynamic and monthly-indexed variable retail electricity tariffs. Using high-resolution smart-meter data from 2,400 real Belgian households—grouped into eight consumer archetypes—the analysis evaluates yearly energy costs, household-level switching incentives, and the resulting implications for consumers, suppliers, and policymakers.

The results show that the benefits of dynamic tariffs are highly heterogeneous. Households with electric vehicles and/or heat pumps are structurally positioned to benefit from dynamic pricing, while asset-light households and PV-dominated households experience smaller and less robust gains. Even when average costs under dynamic and variable tariffs are similar, dynamic tariffs expose households to a wider range of outcomes, increasing both potential savings and potential losses.

Importantly, switching incentives translate into non-random adoption. Households that would rationally choose dynamic tariffs differ systematically from the average customer in both electricity volume and load shape. As a result, uptake of dynamic tariffs—even when entirely voluntary—leads to self-selection, whereby households with flexible or price-aligned consumption profiles disproportionately migrate to dynamic contracts.

This self-selection has two consequences. First, households that remain on variable tariffs increasingly consist of those with less steerable consumption or limited ability to benefit from dynamic pricing. Second, even modest adoption rates of dynamic tariffs can represent a disproportionately large share of total electricity demand, reshaping supplier portfolios through composition effects alone.

From a policy perspective, these findings do not argue for or against dynamic tariffs as such. Rather, they highlight that tariff choice is not neutral at the system level, even when left entirely to consumers. Widespread availability of dynamic tariffs can lead to a form of market sorting in which households that benefit most migrate to dynamic contracts, while others remain on traditional variable tariffs with different cost and risk characteristics. Recognising and anticipating this sorting effect is essential for informed policy design, consumer protection, and retail market regulation.

This report establishes a transparent, energy-only baseline for understanding these dynamics. Subsequent phases will examine how behavioural response and active demand steering further

modify both consumer outcomes and system-level impacts.

Key Contributions of This Report

This report makes three main contributions to the discussion on retail electricity pricing and dynamic tariffs:

Profile-based evaluation using real smart-meter data

The analysis is grounded in 2,400 real, anonymised digital-meter datasets from Belgian households, grouped into eight asset-based consumer archetypes. This enables statistically meaningful comparisons while preserving within-group heterogeneity.

Clear separation between tariff exposure, switching incentives, and adoption outcomes

The report distinguishes explicitly between:

- ex-ante exposure to tariff classes (dynamic vs. variable),
- household-level switching incentives under explicit comparison,
- and portfolio-level outcomes driven by self-selection and behavioural inertia.

This separation avoids common misinterpretations that arise when these concepts are conflated.

Supplier-relevant perspective on dynamic tariff uptake

By analysing adoption both in terms of household counts and energy volumes, the report demonstrates how dynamic tariffs can reshape supplier portfolios through self-selection alone. This highlights risks and dynamics that are not visible in average-cost or headline adoption analyses.

Together, these contributions move the debate beyond average bill comparisons toward a more nuanced understanding of distributional effects, market sorting, and system relevance.

Principal Findings

The analysis yields the following principal findings:

Dynamic tariffs benefit highly electrified households disproportionately

Households with electric vehicles and/or heat pumps are structurally positioned to benefit from dynamic pricing. They account for most of the substantial savings observed, while asset-light households experience small and often marginal gains.

PV self-consumption dampens tariff choice relevance

On-site PV significantly reduces exposure to wholesale price variability, compressing cost distributions under both tariff types. For PV-heavy households, tariff choice plays a secondary role relative to self-consumption.

Dynamic tariffs increase outcome dispersion

Compared to variable tariffs, dynamic tariffs generally produce wider cost distributions. Even when average costs are comparable, dynamic pricing reallocates price risk to consumers, increasing both upside potential and downside exposure.

Switching incentives do not translate into broad adoption

Once modest behavioural inertia is introduced—modelled as a minimum savings requirement of €25–€50 per year—potential adoption declines sharply across most groups. Headline estimates of beneficiaries therefore overstate realistic uptake.

Energy volume moves faster than headcount

Although household adoption drops quickly as switching thresholds rise, the share of total electricity consumption associated with switchers declines more slowly. Highly electrified households dominate dynamic tariff portfolios even at low adoption rates.

Self-selection reshapes supplier portfolios before any demand response

Households that self-select into dynamic tariffs differ systematically in load shape and variability. Depending on the adopting segment, dynamic tariff uptake can either reduce or exacerbate exposure to evening peak demand and price volatility.

Who adopts matters more than how many adopt

The system and supplier impacts of dynamic tariffs are driven primarily by the composition of adopters, not by aggregate adoption rates. This has direct implications for retail market design, risk management, and policy targeting.

Contents

1 Introduction

This report presents the first phase of an analysis examining the interaction between household electricity consumption profiles and retail tariff design, with a focus on dynamic versus monthly-indexed variable tariffs. The analysis addresses key questions for energy experts and policy makers: whether dynamic tariffs are more advantageous than variable electricity tariffs, when residential customers will start switching, and what the impact on suppliers will be. A follow-up analysis, looking into the effects on the supplier portfolio and imbalance will be delivered as D1.1.3 in 2026.

2 Methodology

2.1 Purpose and scope

This analysis evaluates yearly electricity costs for residential consumption profiles under dynamic and monthly-indexed variable tariff structures. The objective is to understand how tariff design interacts with household load profiles and asset configurations, and how these interactions translate into switching incentives, self-selection effects, and portfolio-level implications.

The analysis is explicitly *energy-only*. It focuses solely on the energy component of electricity costs and excludes:

- distribution and transmission grid fees
- capacity tariffs
- VAT
- injection remuneration for exported electricity

This abstraction allows a clean comparison of tariff structures and price exposure mechanisms. While absolute cost levels are therefore lower than real household bills, relative differences between tariff types and consumer groups are preserved, which is the primary focus of this study.

2.2 Consumption data

The analysis is based on 2,400 real, anonymised residential digital meter profiles obtained from the open data portal of Fluvius. The original dataset consists of high-resolution electricity measurements collected from smart meters and published as open data for research and policy analysis purposes.

Each profile contains a full year of quarter-hourly electricity consumption data (15-minute resolution). Profiles are grouped into eight consumer segments, each containing 300 profiles, reflecting different combinations of household electrification and on-site generation assets:

1. households without PV, heat pump, or EV

2. households with PV only
3. households with EV only
4. households with EV and PV
5. households with heat pump only
6. households with heat pump and PV
7. households with heat pump and EV
8. households with heat pump, EV, and PV

This grouping enables statistically meaningful comparisons across archetypal consumer types while preserving heterogeneity within each group.

Each profile is treated as an independent household and retains its original load shape throughout the analysis; no synthetic scaling or behavioural modification is applied.

2.3 Price data and tariff definitions

2.3.1 Dynamic tariffs

Dynamic tariffs are indexed to quarter-hourly wholesale spot prices. For each dynamic contract, the energy rate is defined as:

$$\text{rate}_t \text{ (EUR/kWh)} = \frac{a \cdot P_t^{\text{spot}} + b}{100} \tag{1}$$

where:

- P_t^{spot} is the quarter-hourly spot price in EUR/MWh
- a is a multiplicative coefficient
- b is an additive coefficient in eurocents/kWh

Yearly energy cost for a given profile is computed as the sum over all quarter-hours of consumption multiplied by the corresponding dynamic rate, plus any fixed yearly fee associated with the contract.

Seven dynamic tariff contracts from different suppliers are included. In addition, a wholesale baseline is computed as the pure spot-price cost without mark-ups or fixed fees, serving as a reference for structural comparison rather than a retail offer.

2.3.2 Variable tariffs

Variable tariffs are indexed to monthly index values, typically based on forward-looking or averaged wholesale price indices. For each variable contract, the monthly rate is defined as:

$$\text{rate}_m \text{ (EUR/kWh)} = \frac{a \cdot I_m^{\text{month}} + b}{100} \tag{2}$$

where I_m^{month} is the monthly index value in EUR/MWh.

Monthly costs are computed by multiplying total monthly consumption by the applicable rate and adding one-twelfth of the yearly fixed fee. Yearly costs are obtained by summing monthly costs over the full year:

$$\text{yearly\_cost} = \sum_{m=1}^{12} \left(\text{monthly\_consumption}_m \times \text{rate}_m + \frac{\text{fixed\_cost}}{12} \right) \tag{3}$$

Ten variable tariff contracts from different suppliers are included in the analysis.

2.4 Cost calculation and aggregation logic

For each of the 2,400 consumption profiles, yearly energy costs are computed under:

- the wholesale baseline
- all dynamic tariff contracts
- all variable tariff contracts

This results in a matrix of profile-by-contract outcomes that supports multiple aggregation perspectives.

Two distinct aggregation logics are used:

Tariff-class exposure analysis Costs are pooled across all profiles and all contracts within a tariff class (dynamic or variable). This produces cost distributions that characterise tariff classes, rather than individual suppliers.

Per-profile switching analysis For each profile, dynamic and variable tariff outcomes are compared directly to assess switching incentives. Two variants are computed:

- **average-vs-average**: mean cost across all dynamic contracts compared to mean cost across all variable contracts
- **best-vs-best**: lowest dynamic cost compared to lowest variable cost

These two perspectives capture, respectively, uninformed or risk-neutral choice and fully informed contract selection.

2.5 Self-selection and adoption threshold analysis

Switching between tariff types is not assumed to be random. Households that expect to benefit from dynamic pricing are more likely to adopt it, creating self-selection effects.

To approximate behavioural inertia and switching frictions, a deterministic savings threshold model is used. For a given threshold T (EUR/year), a profile is considered a potential switcher if:

$$\Delta = C_{\text{dynamic}} - C_{\text{variable}} < -T \tag{4}$$

Thresholds ranging from €0 to €200 per year are evaluated. For each group and threshold, the analysis computes:

- the share of profiles switching
- the share of total electricity consumption represented by switchers
- differences in load-shape characteristics between baseline and switchers

In addition, typical day profiles are computed by averaging quarter-hourly consumption across all days of the year, allowing a visual comparison of baseline and switcher load shapes.

2.6 Interpretation boundaries

Several methodological boundaries are deliberate:

- **Passive behaviour**: No demand response or load shifting is modelled. All results reflect pre-existing consumption patterns.
- **Energy-only costs**: Grid fees, capacity tariffs, VAT, and injection remuneration are excluded.
- **Historical context**: Results are based on 2024 consumption and price data and do not represent forecasts.
- **Descriptive peak metrics**: Time-of-day indicators (e.g. evening peak windows) are used as descriptive proxies for exposure to system-critical hours, not as operational definitions of system peaks.

These choices ensure that this analysis 1 establishes a transparent baseline for understanding structural incentives and portfolio effects, which later phases can extend by introducing behavioural adaptation and system feedbacks.

3 Results

3.1 Cost distributions by profile group

Figures 1 and 2 present the distribution of yearly electricity costs for each consumer profile group under dynamic and variable tariffs, respectively. For each group, costs are computed for all households and for all contracts within the relevant tariff class, and the resulting outcomes are pooled. These distributions therefore characterise tariff classes, not individual supplier offers.

Interpreted probabilistically, each boxplot answers the question: for a randomly chosen household within a given group, and a randomly chosen contract of the specified tariff type, what is the distribution of yearly energy costs? This framing deliberately abstracts from contract choice in order to isolate how tariff design interacts with household load profiles and asset configurations.

Several broad patterns emerge. First, cost levels differ substantially across profile groups, reflecting differences in total electricity demand driven by electrification and asset ownership. Groups combining heat pumps and electric vehicles exhibit the highest absolute costs, while asset-light households and PV-dominated households show substantially lower net expenditures.

Second, dynamic tariffs (Figure 1) generally produce wider cost distributions than variable tariffs (Figure 2). This increased dispersion reflects greater exposure to wholesale price variability under dynamic pricing. In some groups, mean yearly costs under dynamic and variable tariffs are comparable, yet the range of possible outcomes under dynamic tariffs is markedly larger, indicating higher upside potential but also higher downside risk.

Third, the presence of on-site PV systematically compresses cost distributions under both tariff types. PV reduces exposure to grid prices by offsetting consumption, thereby dampening both average costs and variability. As a result, differences between dynamic and variable tariffs are less pronounced for PV-heavy groups than for otherwise similar households without PV.

It is important to note what these figures do not show. Because outcomes are pooled across multiple supplier contracts, the distributions do not indicate whether a given household should switch tariffs, nor do they rank suppliers. Instead, they provide an ex-ante exposure perspective: how different consumer archetypes are positioned with respect to each tariff class before any contract choice or behavioural response is considered.

As such, Figures 1 and 2 serve as a baseline against which the subsequent switching analysis is interpreted. The following sections move from tariff-class exposure to household-level comparisons, identifying which households benefit from dynamic tariffs, how strongly, and how these incentives translate into self-selection and adoption patterns.

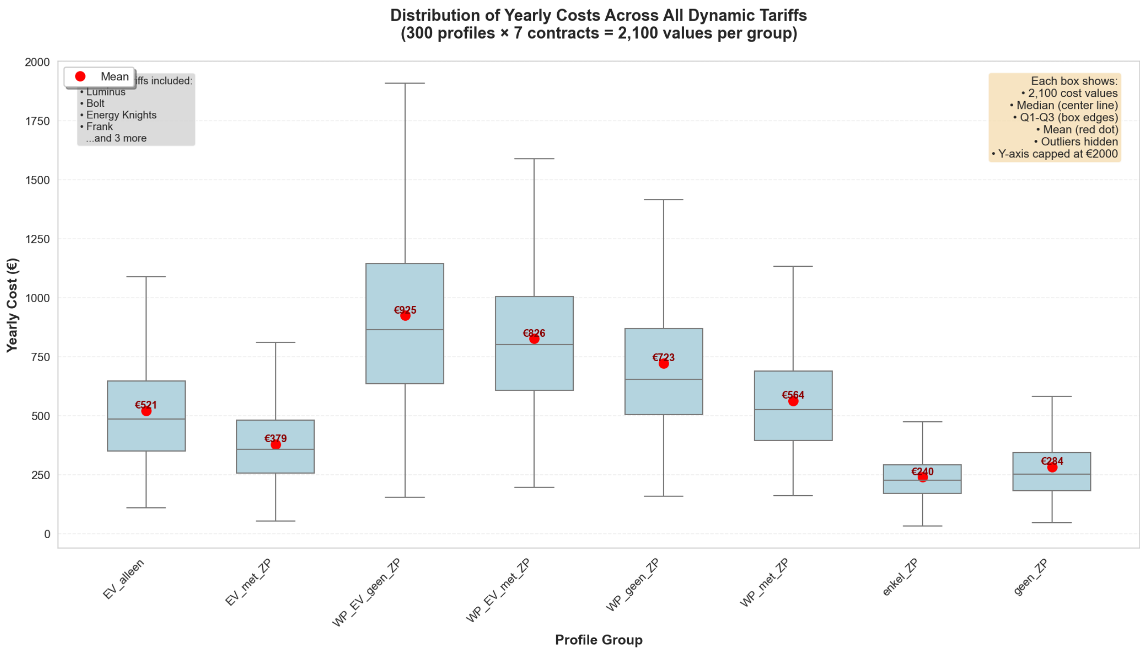

Figure 1: Distribution of yearly costs across all dynamic tariffs by profile group.

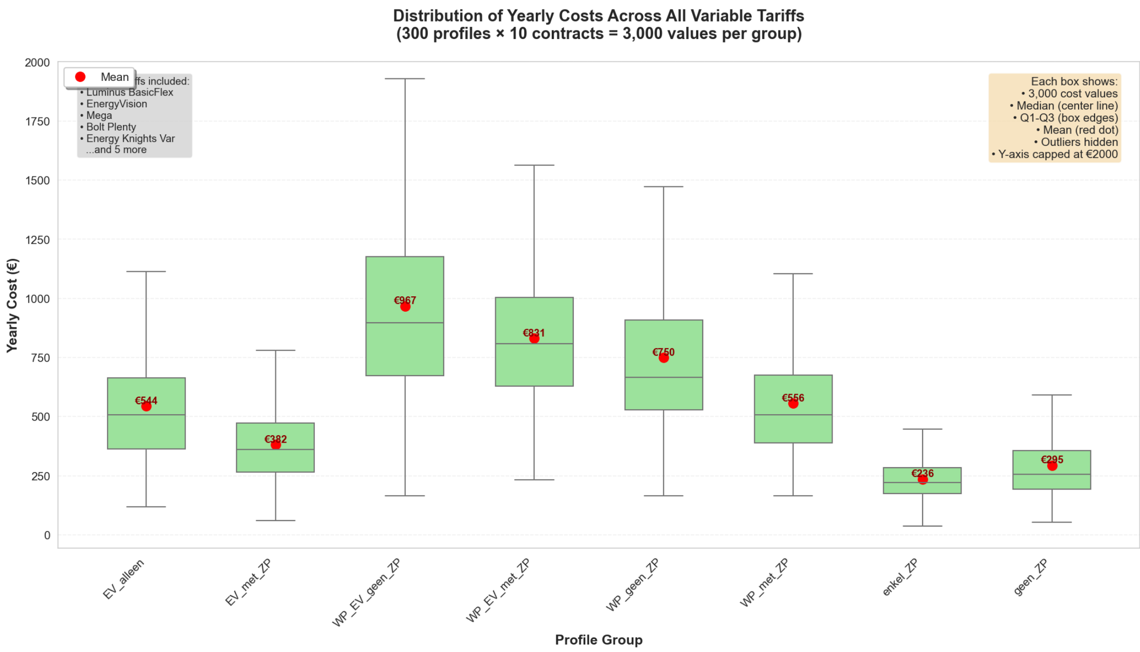

Figure 2: Distribution of yearly costs across all variable tariffs by profile group.

3.2 Dynamic vs variable tariffs: winners and losers

Figures 3–6 examine how households compare dynamic and variable tariffs when contract choice is made explicitly, rather than through pooled exposure to tariff classes. For each household, yearly energy costs under dynamic and variable tariffs are compared, and the resulting cost difference

$$\Delta = C_{\text{dynamic}} - C_{\text{variable}} \tag{5}$$

is evaluated. Negative values indicate that dynamic tariffs are cheaper, while positive values indicate an advantage for variable tariffs.

Two comparison variants are shown. The average-vs-average comparison (Figures 3 and 5) contrasts the mean cost across all dynamic contracts with the mean cost across all variable contracts, providing a conservative, supplier-agnostic benchmark. The best-vs-best comparison (Figure 4) contrasts the cheapest dynamic contract with the cheapest variable contract available to each household, reflecting a more optimistic consumer-choice perspective. The cumulative distribution of cost differences for the average-vs-average case is shown in Figure 6.

Across all groups, results demonstrate that the incentive to switch between tariff types is highly heterogeneous and strongly dependent on asset configuration. Households combining heat pumps and/or electric vehicles without on-site PV (WP_EV_geen_ZP, WP_geen_ZP) exhibit a clear structural advantage under dynamic pricing. In these groups, the majority of households experience lower costs on dynamic tariffs (Figures 5 and 6), and the distributions display long negative tails, indicating substantial potential savings for a subset of profiles.

Electric-vehicle-only households (EV_alleen) also show a strong tilt toward dynamic tariffs, although with a narrower distribution than heat-pump groups. This suggests that while most EV households benefit from dynamic pricing, the magnitude of gains is more moderate and less dispersed.

In contrast, households without flexible assets (geen_ZP) and households dominated by PV self-consumption (enkel_ZP, EV_met_ZP) show much more concentrated distributions around zero. For these groups, a non-negligible share of households benefits from dynamic tariffs, but gains are generally small, and downside risk is limited. Dynamic pricing in these cases primarily redistributes modest cost differences rather than delivering large structural savings.

Households combining heat pumps with PV (WP_met_ZP) occupy an intermediate position. While some households benefit from dynamic pricing, a majority experiences higher costs under dynamic tariffs in the average-vs-average comparison (Figure 5). PV dampens exposure to wholesale price variability, reducing both the upside and downside of dynamic pricing and shifting the balance toward variable tariffs for many profiles.

The cumulative distributions in Figure 6 provide an integrated view of these effects. The fraction of households with $\Delta < 0$ corresponds directly to the share of winners under dynamic tariffs, while the slope and tails of the curves convey the magnitude and dispersion of gains and losses. Groups with steep curves concentrated near zero exhibit limited economic relevance of switching, even when a majority formally "wins," whereas groups with shallow curves and long negative tails combine high participation rates with substantial individual savings.

Comparing Figures 3 and 4 further highlights the role of contract choice. The best-vs-best comparison systematically shifts distributions leftward, increasing the share of winners across all groups. However, the relative ordering of consumer groups remains unchanged. This indicates that while competitive supplier offers can improve outcomes at the margin, the primary determinant of switching incentives is household load shape and asset configuration, not supplier identity.

Overall, these results show that dynamic tariffs do not deliver uniform benefits across households. Instead, they create asymmetric incentives, strongly favouring highly electrified and flexible households while offering limited or uncertain benefits to others. This heterogeneity motivates the subsequent analysis of self-selection and adoption elasticity, which examines how these incentives translate into actual portfolio composition under voluntary switching.

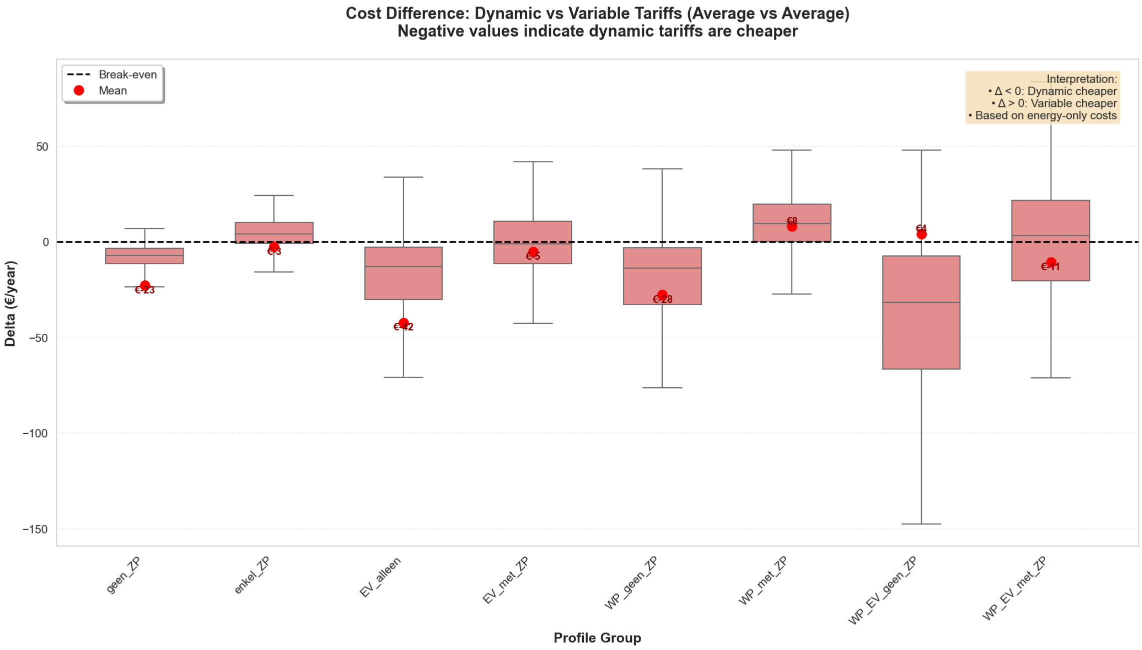

Figure 3: Distribution of cost differences (dynamic - variable) by profile group, average-vs-average comparison.

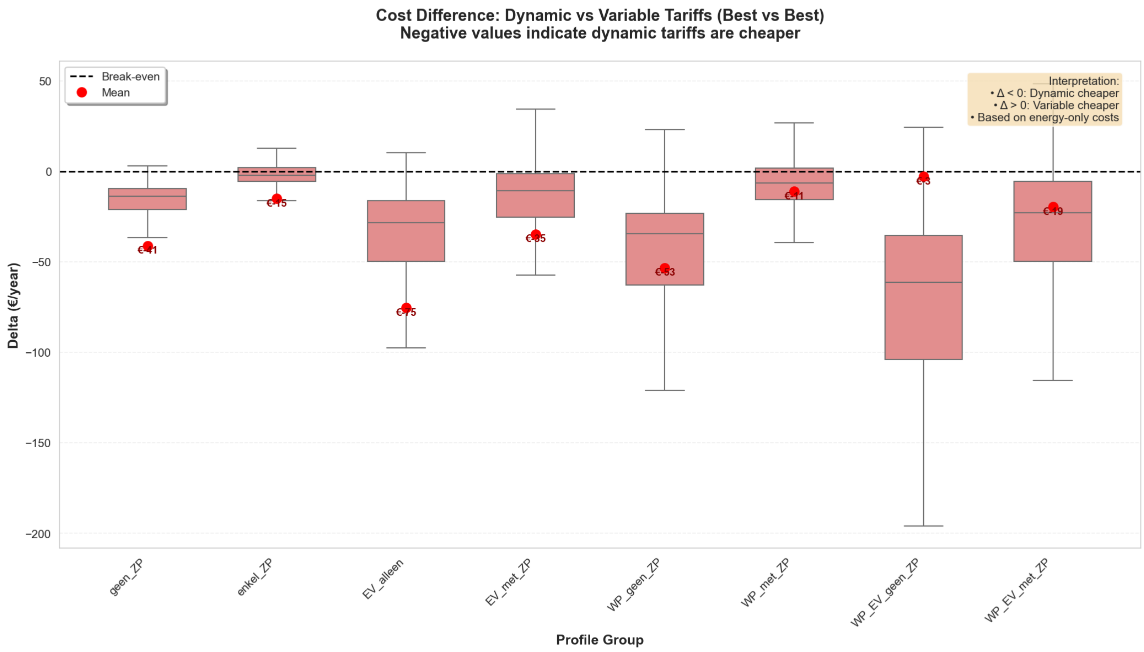

Figure 4: Distribution of cost differences (dynamic - variable) by profile group, best-vs-best comparison.

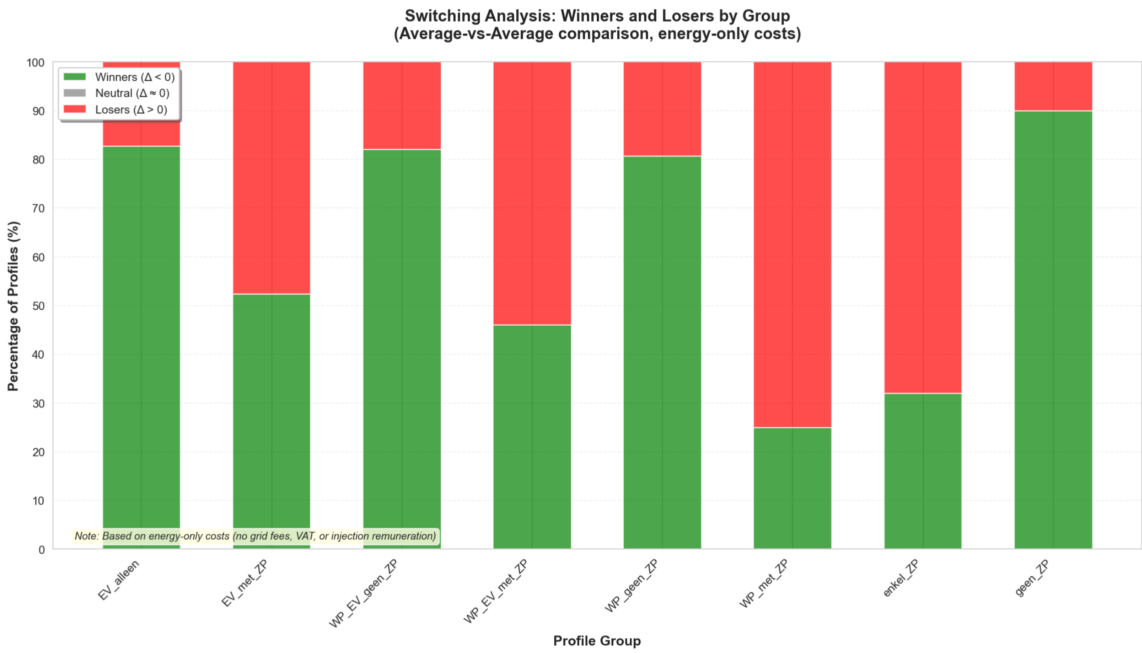

Figure 5: Share of winners, losers, and neutral profiles by group (average-vs-average comparison).

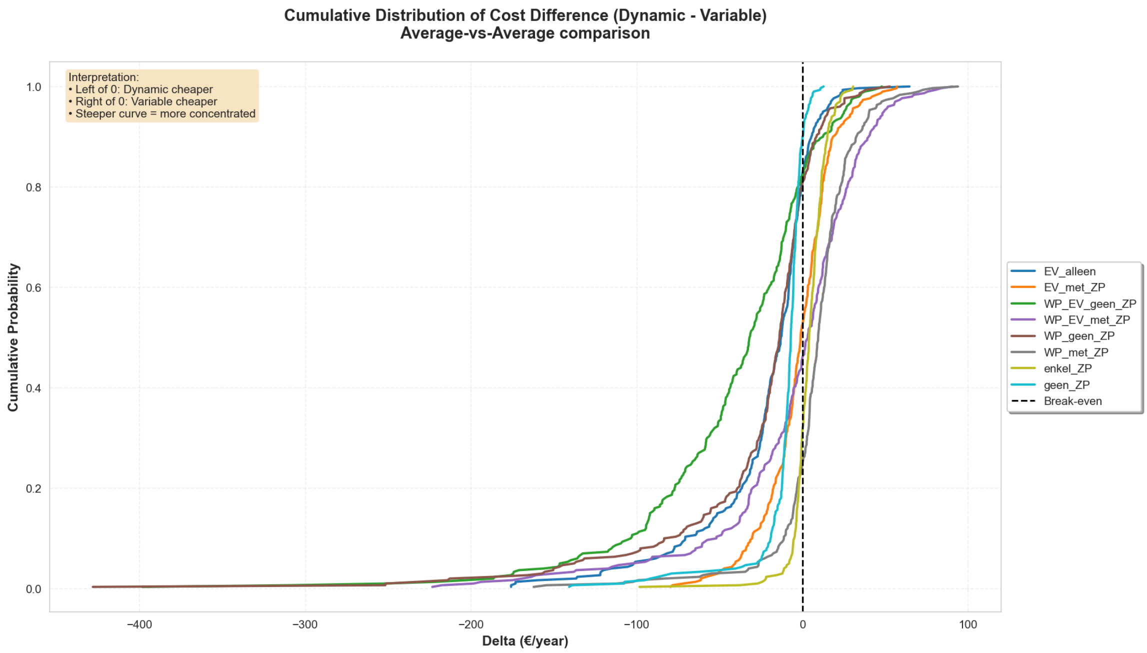

Figure 6: Cumulative distribution of cost differences (dynamic - variable) by profile group.

3.3 Self-selection effects on load shape

Figures 7–14 compare the typical daily electricity consumption profile of all households within each consumer group ("baseline") with that of households that would rationally switch to a dynamic tariff when requiring at least €50/year in expected savings ("switchers"). Importantly, these profiles reflect pre-existing consumption patterns: no load shifting, optimisation, or behavioural response to dynamic prices is assumed. Differences therefore arise purely from self-selection into dynamic tariffs.

Across all groups, households that self-select into dynamic tariffs exhibit more uneven and temporally concentrated load profiles than the group average. Dynamic tariffs thus do not attract a random subset of consumers; instead, they disproportionately attract profiles whose existing consumption happens to align with periods of lower wholesale prices or greater price volatility.

For households without flexible assets (geen_ZP, Figure 7), switchers display highly irregular load profiles characterised by sharp evening and late-night peaks, despite relatively low average consumption. These households benefit financially from dynamic pricing not because they are flexible, but because their consumption coincides with low-price hours by chance. This indicates that dynamic tariffs can select variance rather than system-friendly load shapes.

Solar-only households (enkel_ZP, Figure 8) show a different pattern. Switchers in this group have very low daytime consumption—largely shielded by self-consumption—and sharp evening spikes. Dynamic pricing primarily rewards households whose remaining grid consumption is concentrated in a small number of hours, making their costs sensitive to price fluctuations despite limited total energy volume.

In contrast, electric-vehicle households (EV_alleen, Figure 9) display a markedly different self-selection pattern. Switchers exhibit strong night-time and late-evening consumption, consistent with existing EV charging behaviour that already aligns with lower wholesale prices. Here, dynamic tariffs reinforce pre-existing price-aligned behaviour rather than selecting accidental winners.

Households combining EVs with solar PV (EV_met_ZP, Figure 10) show both reduced evening peaks and increased midday consumption among switchers. This reflects an interaction between PV self-consumption and EV charging that already exploits temporal price differences. For this group, self-selection into dynamic tariffs tends to reduce evening peak exposure, which is favourable from a system and supplier perspective.

Heat-pump households without PV (WP_geen_ZP, Figure 11) and those with both heat pumps and EVs but no PV (WP_EV_geen_ZP, Figure 13) are particularly system-relevant. Switchers in these groups retain substantial evening and night-time demand and exhibit higher overall load levels than the group average. Dynamic tariffs therefore attract households with large volumes and high temporal variability, concentrating both energy volume and price exposure among switchers.

Finally, households with both heat pumps and PV (WP_met_ZP, Figure 12) or with the full asset combination (WP_EV_met_ZP, Figure 14) show a more favourable pattern. Switchers in these groups combine significant midday consumption with a dampened evening peak, indicating that PV mitigates the peak exposure otherwise associated with electrified heating and transport.

Overall, these results demonstrate that self-selection alone reshapes the load composition of dynamic tariff portfolios, even before any behavioural response occurs. Depending on the asset mix of adopting households, dynamic tariffs can either reduce or exacerbate evening peak exposure and portfolio risk. This highlights that the system and supplier impacts of dynamic pricing depend critically on who adopts dynamic tariffs, not merely on aggregate adoption rates.

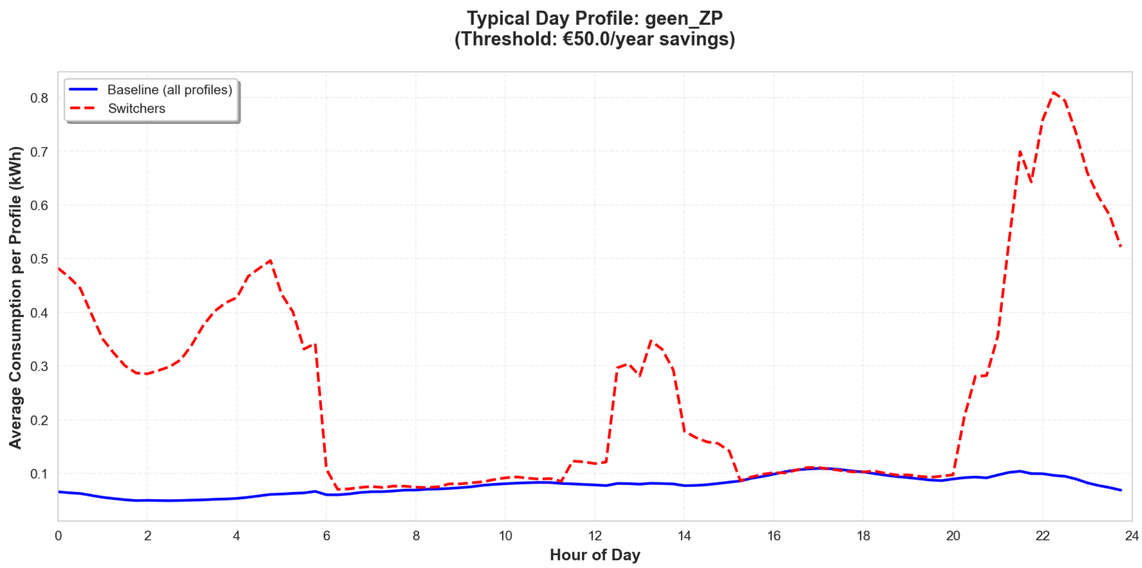

Figure 7: Typical day profile comparison for group geen_ZP (threshold: €50/year savings).

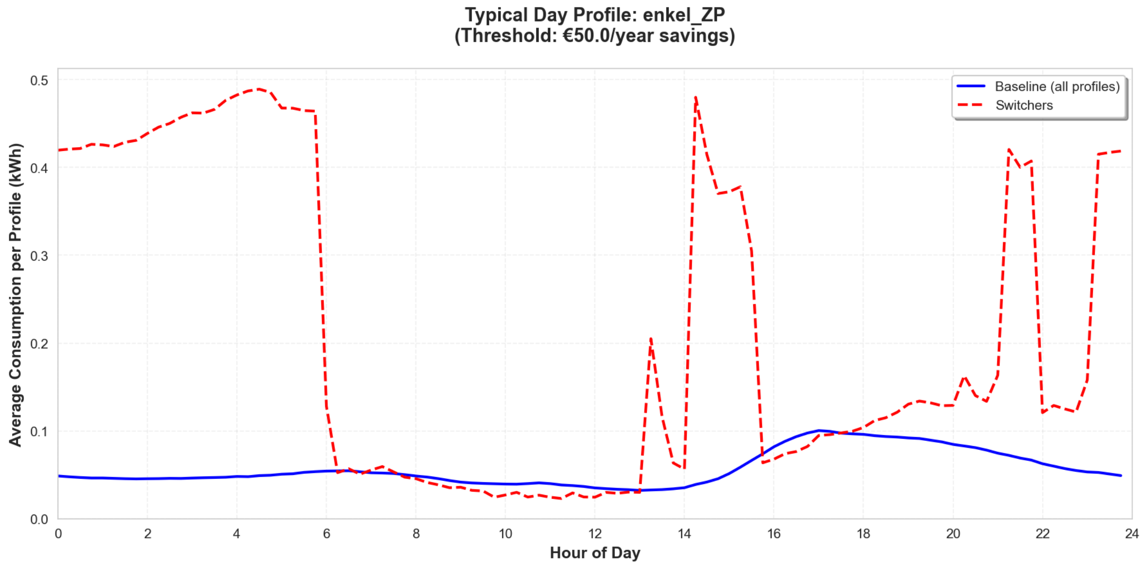

Figure 8: Typical day profile comparison for group enkel_ZP (threshold: €50/year savings).

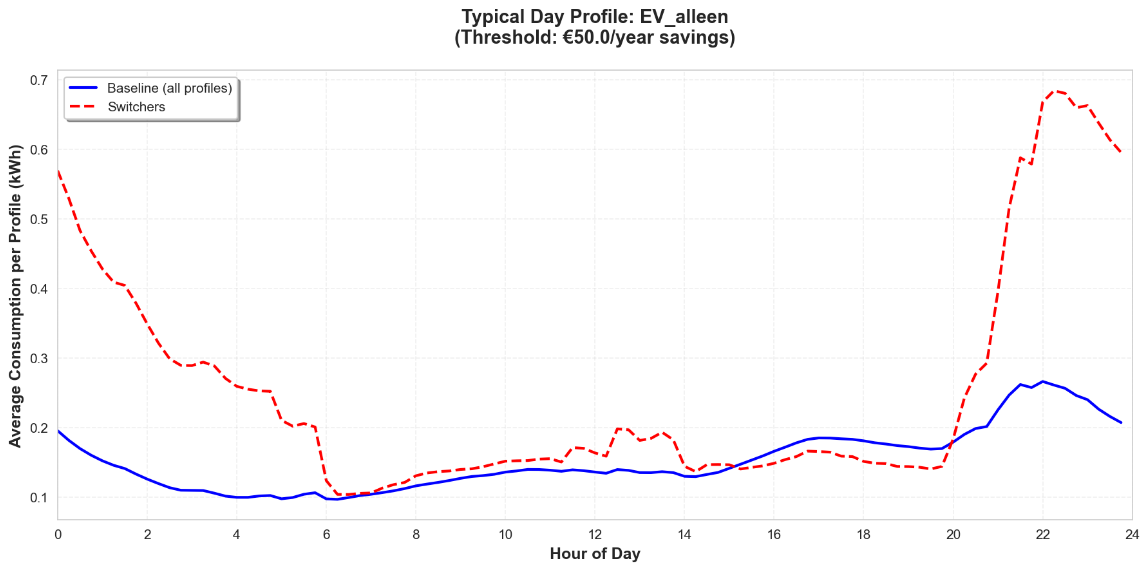

Figure 9: Typical day profile comparison for group EV_alleen (threshold: €50/year savings).

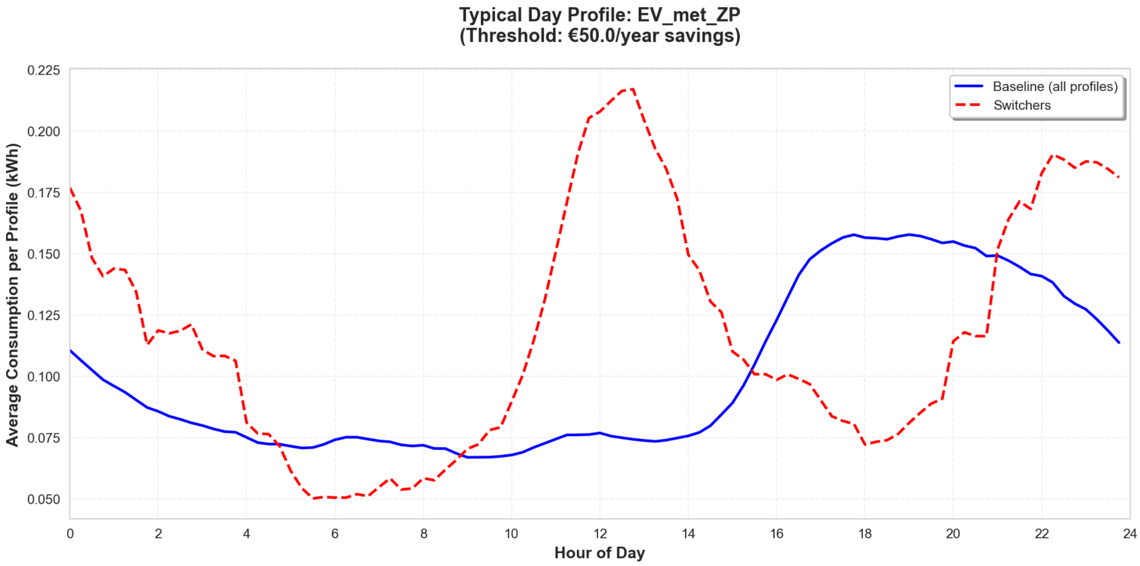

Figure 10: Typical day profile comparison for group EV_met_ZP (threshold: €50/year savings).

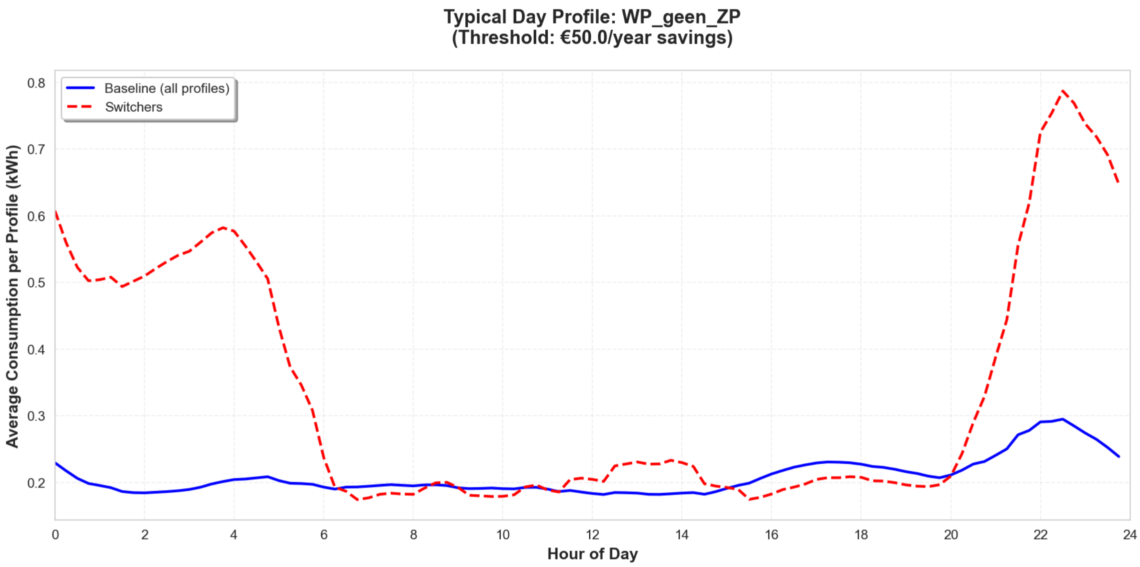

Figure 11: Typical day profile comparison for group WP_geen_ZP (threshold: €50/year savings).

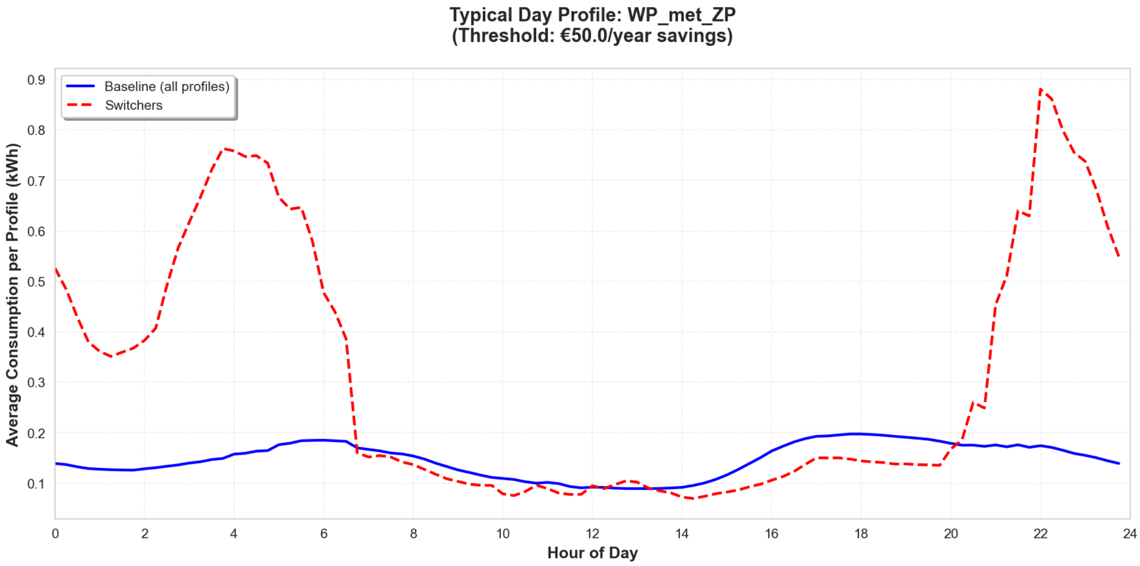

Figure 12: Typical day profile comparison for group WP_met_ZP (threshold: €50/year savings).

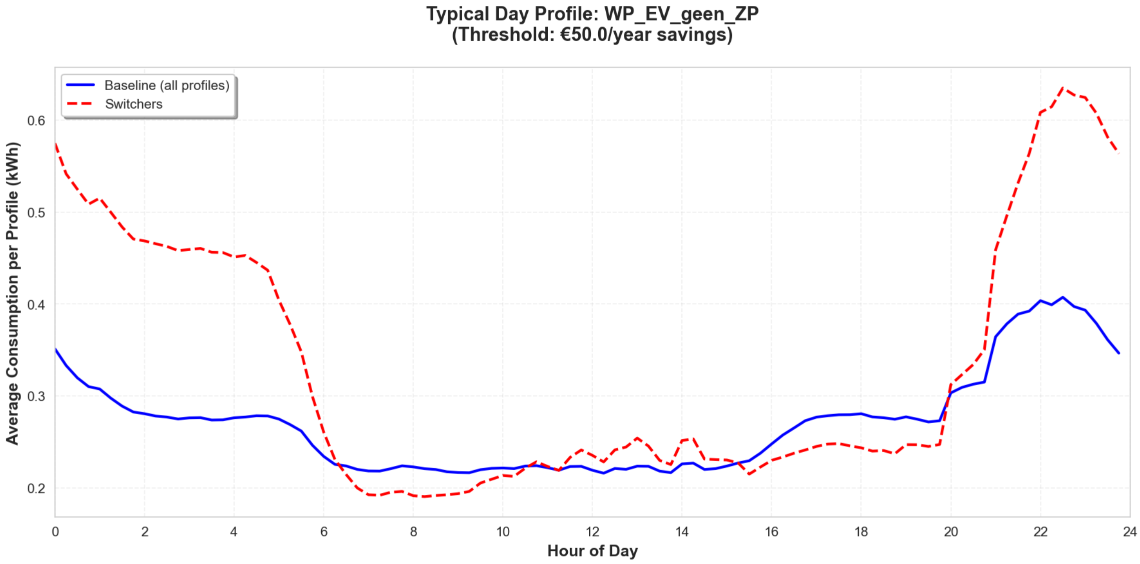

Figure 13: Typical day profile comparison for group WP_EV_geen_ZP (threshold: €50/year savings).

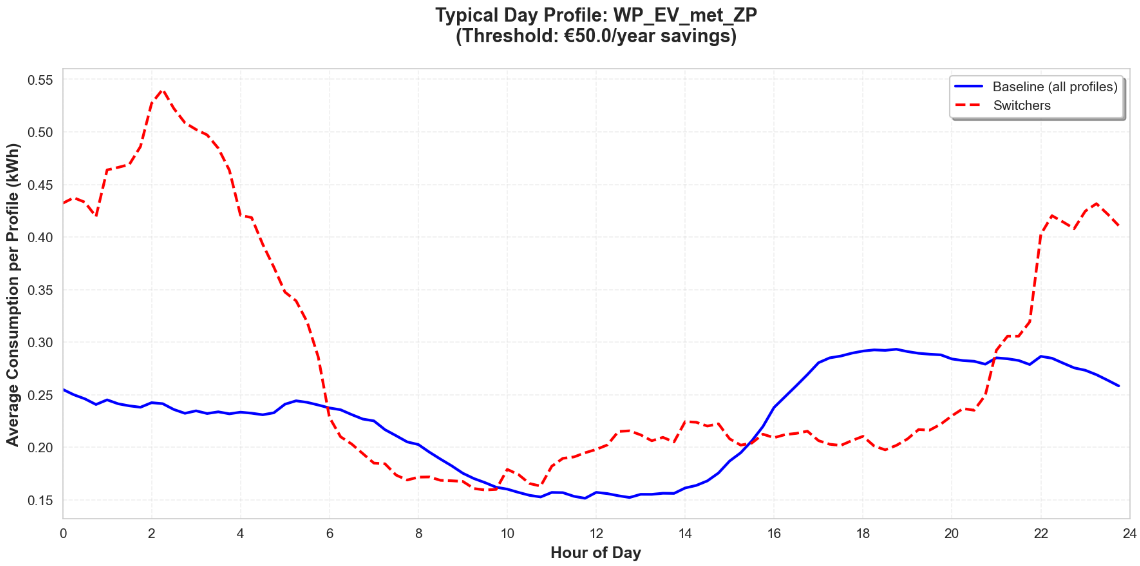

Figure 14: Typical day profile comparison for group WP_EV_met_ZP (threshold: €50/year savings).

3.4 Adoption and energy-volume elasticity

Figures 15 and 16 examine how potential adoption of dynamic tariffs varies with the minimum annual savings households require in order to switch. This switching threshold acts as a proxy for behavioural inertia, reflecting factors such as risk aversion, effort costs, and uncertainty regarding realised savings. Two complementary dimensions are analysed: the share of households switching (Figure 15) and the share of total electricity consumption represented by those switchers (Figure 16).

Across all consumer groups, adoption declines sharply as the required savings threshold increases. While a substantial fraction of households would benefit from dynamic tariffs when any positive savings suffice, realistic thresholds of €25–€50/year already eliminate the majority of potential switchers. This indicates that headline estimates of "potential beneficiaries" substantially overstate plausible uptake once even modest behavioural frictions are taken into account.

However, Figure 16 shows that adoption in terms of energy volume declines more slowly than adoption in terms of households. In several groups, switchers represent a disproportionately large share of total electricity consumption relative to their numerical share. This divergence implies that dynamic tariff uptake, even at low headcount levels, can materially reshape supplier portfolios.

Electric-vehicle households (EV_alleen) illustrate this effect clearly. While the share of switching households falls rapidly as thresholds rise (Figure 15), the share of total energy consumption associated with switchers remains comparatively high (Figure 16). This reflects the fact that EV-owning households are both more price-exposed and more electricity-intensive than the group average.

The strongest effect is observed for households combining heat pumps and electric vehicles without PV (WP_EV_geen_ZP). Even at switching thresholds of €50–€100/year, a relatively small fraction of households accounts for a very large share of total group consumption. This group therefore dominates dynamic tariff portfolios in terms of energy volume, highlighting that electrified households are central to the system impact of dynamic pricing.

By contrast, households with solar PV—particularly EV_met_ZP and enkel_ZP—exhibit both lower adoption rates and rapidly declining energy shares as thresholds increase. PV self-consumption reduces exposure to wholesale price variability, limiting the incremental benefit of dynamic tariffs and constraining both uptake and portfolio impact.

Households without flexible assets (geen_ZP) display high adoption at near-zero thresholds but almost no uptake once modest savings requirements are imposed. Moreover, their energy share declines even faster than their headcount share, indicating that dynamic tariffs do not mobilise significant energy volumes in this group.

Taken together, these results demonstrate that dynamic tariff adoption is highly non-linear and strongly skewed toward high-consumption households. Modest behavioural inertia sharply limits household-level uptake, but the remaining adopters represent a disproportionate share of electricity demand. Consequently, the system and supplier implications of dynamic pricing depend far more on the composition of adopters than on aggregate adoption rates. Even limited switching can significantly alter portfolio risk, price exposure, and imbalance dynamics if it is concentrated among highly electrified households.

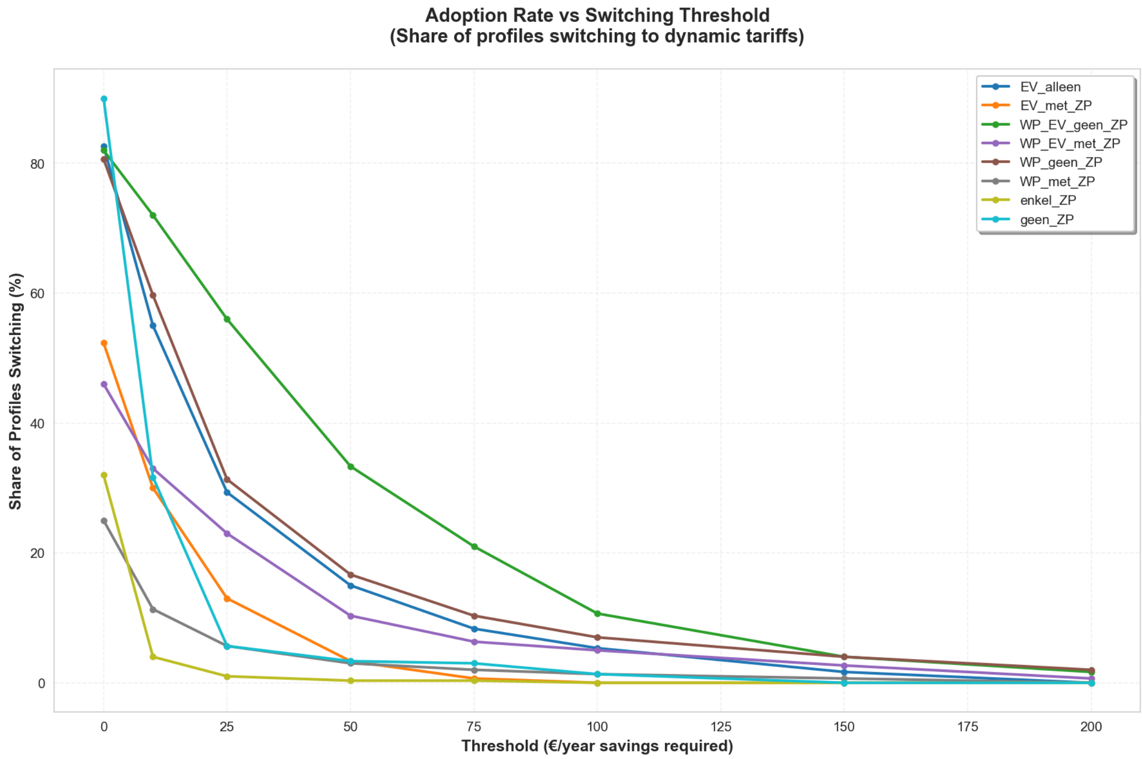

Figure 15: Adoption rate (share of profiles switching) as a function of switching threshold.

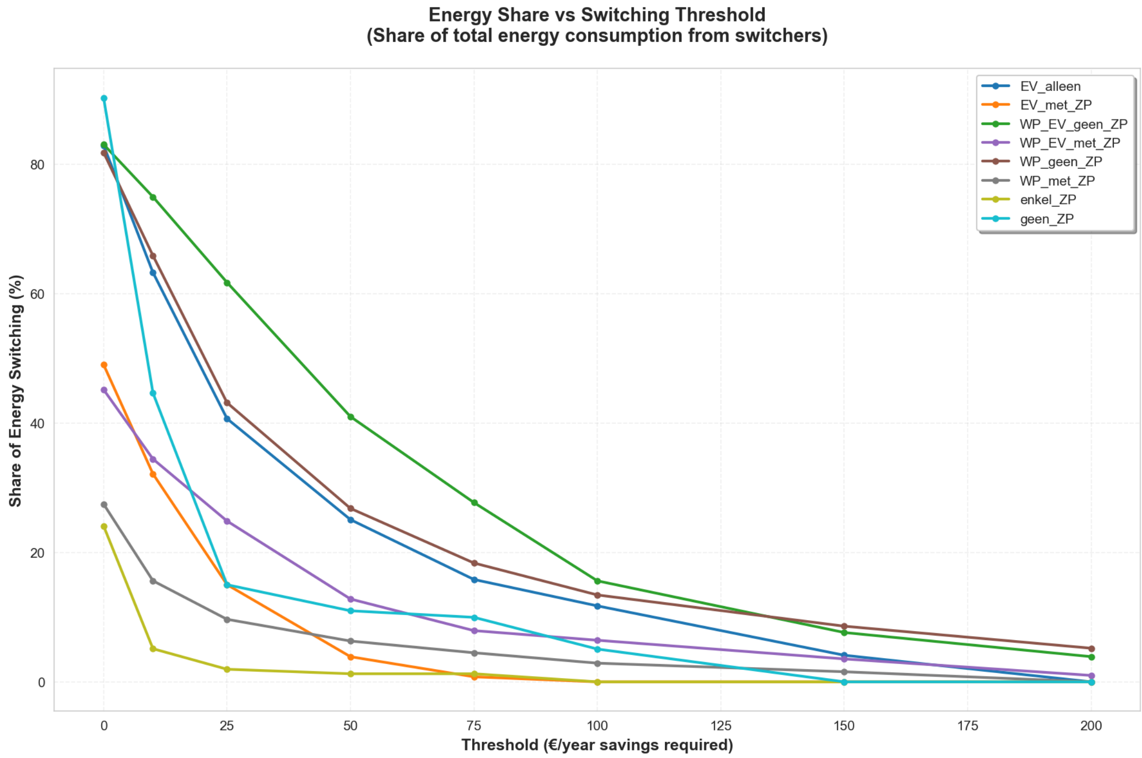

Figure 16: Energy share (share of total consumption from switchers) as a function of switching threshold.

4 Discussion

4.1 Implications for consumers and policy

The results demonstrate that dynamic tariffs do not deliver uniform benefits across households. Instead, they create highly asymmetric incentives that depend primarily on household electrification level, load shape, and asset configuration. Highly electrified households—particularly those with heat pumps and electric vehicles—are structurally positioned to benefit from dynamic pricing, while households without flexible assets or with PV-dominated consumption profiles face limited upside and, in some cases, higher downside risk.

From a consumer-protection perspective, these findings challenge the notion that dynamic tariffs are universally advantageous or that broad uptake should be expected once such tariffs are made available. Even when average costs under dynamic and variable tariffs are similar, dynamic tariffs expose households to greater dispersion in outcomes. For asset-light households, dynamic pricing often redistributes modest gains and losses rather than delivering meaningful savings, suggesting that mandatory or default dynamic pricing could increase perceived risk without commensurate benefit.

The analysis also highlights that headline estimates of potential beneficiaries substantially overstate realistic uptake. Once even modest behavioural inertia is introduced—modelled here through minimum savings thresholds of €25–€50 per year—adoption drops sharply across most consumer groups. This implies that policies relying on voluntary switching to dynamic tariffs should expect limited participation outside highly electrified households.

At the same time, the results support targeted policy approaches. Dynamic tariffs are most effective and least contentious when offered to households with clear structural advantages—such as EV and heat-pump owners—where savings are larger, more robust, and more easily communicated. Conversely, for PV-heavy households, tariff choice plays a secondary role relative to self-consumption, and policy attention may be better directed toward complementary measures.

Overall, the results suggest that dynamic tariffs should be viewed as a selective instrument, rather than a universal solution, within broader retail market and flexibility policy frameworks.

4.2 Implications for suppliers and portfolio risk

For suppliers, the most consequential finding is that dynamic tariffs reshape portfolios not only through pricing, but through self-selection of customers. Even before any behavioural response occurs, households that choose dynamic tariffs differ systematically from the average customer in terms of load magnitude, temporal concentration, and exposure to wholesale price volatility.

The adoption and energy-volume elasticity analysis shows that dynamic tariff portfolios can become highly concentrated in energy volume, even when headcount adoption remains modest. Highly electrified households—particularly those combining heat pumps and electric vehicles—represent a disproportionate share of total consumption among switchers. As a result, small changes in adoption rates can materially alter a supplier's exposure to price risk and imbalance costs.

The load-shape analysis further indicates that self-selection alone can either increase or reduce evening peak exposure, depending on which consumer segments adopt dynamic tariffs. In some asset-rich groups, adoption is associated with reduced evening peaks and greater alignment with lower-price periods. In others, particularly among asset-light households, dynamic tariffs attract profiles with high variance rather than system-friendly load shapes, potentially increasing portfolio volatility.

These findings imply that dynamic tariffs are not a passive retail product from a supplier perspective. Portfolio outcomes depend critically on customer composition, and unmanaged uptake may concentrate risk rather than diversify it. Suppliers therefore face incentives to actively manage dynamic tariff offerings through contract design, customer targeting, hedging strategies, and, eventually, demand-response integration.

Crucially, the results underline that portfolio impacts are driven more by who adopts dynamic tariffs than by aggregate adoption rates. This has direct implications for forecasting, risk management, and the design of retail products that interact with wholesale markets.

4.3 Scope limitations of this analysis

The results presented in this deliverable are intentionally limited in scope. All analyses are energy-only and exclude grid tariffs, capacity charges, taxes, levies, and any remuneration for injection. While this abstraction allows a clean comparison of tariff designs and price exposure, it does not represent final retail bills.

Moreover, this analysis assumes passive behaviour. Households are not assumed to actively respond to dynamic prices through load shifting, smart charging, or optimisation. Differences in outcomes therefore arise solely from existing consumption patterns and self-selection effects. As a result, the analysis captures incentives and portfolio composition effects, but not realised demand response.

The switching thresholds used to approximate behavioural inertia are stylised and deterministic. They are not derived from observed switching behaviour or stated preferences and should be interpreted as scenario parameters rather than empirical elasticities.

Finally, temporal metrics such as the evening peak window are used as descriptive indicators of exposure to system-critical hours, not as precise representations of national peak definitions or balancing constraints.

These limitations are deliberate. This deliverable establishes a transparent baseline: how tariff design interacts with existing load profiles and how voluntary switching reshapes portfolios in the absence of behavioural adaptation. Subsequent deliverable D1.1.3 will build on this foundation by introducing active demand response, steering mechanisms, and system-level feedbacks.

5 Conclusions

This report analysed the interaction between household electricity consumption profiles and retail tariff design, focusing on dynamic versus monthly-indexed variable tariffs under an energy-only framework. Using quarter-hourly consumption data for eight consumer profile groups, this analysis examined cost distributions, household-level switching incentives, self-selection effects, and adoption elasticity in the absence of behavioural response.

Three central findings emerge. First, the benefits of dynamic tariffs are highly heterogeneous. Highly electrified households—particularly those with heat pumps and electric vehicles—are structurally positioned to benefit from dynamic pricing, while asset-light households and PV-dominated households experience limited and uncertain gains. Dynamic tariffs therefore redistribute price exposure asymmetrically rather than delivering uniform cost reductions.

Second, switching incentives translate into non-random adoption. Households that would rationally choose dynamic tariffs differ systematically from the average customer in both consumption volume and load shape. Even modest adoption rates can represent a large share of total electricity demand, especially when uptake is concentrated among highly electrified households. As a result, dynamic tariff portfolios are shaped more by customer composition than by headline adoption rates.

Third, self-selection alone reshapes supplier portfolios, even before any active demand response occurs. Depending on the asset mix of adopting households, dynamic tariffs can either mitigate or exacerbate exposure to evening peak demand and wholesale price volatility. This highlights that dynamic pricing is not a neutral retail instrument: its system and portfolio impacts depend critically on who adopts it.

These results have important implications for policy and market design. Dynamic tariffs appear most effective and least contentious when targeted toward households with clear structural advantages and meaningful savings potential. Broad or default-based deployment risks increasing perceived risk without commensurate benefit for many consumers. For suppliers, unmanaged uptake can concentrate risk rather than diversify it, underscoring the need for active portfolio management and complementary measures.

This analysis deliberately abstracts from behavioural adaptation, network tariffs, and system feedbacks. This provides a transparent baseline against which more complex dynamics can be assessed. The next phase of the analysis will build on this foundation by introducing behavioural steering and demand response, examining how dynamic tariff customers adjust consumption in response to prices, and evaluating the resulting impacts on supplier imbalance risk and system operation.

Together, these phases aim to move the discussion on dynamic tariffs beyond average cost comparisons toward a more nuanced understanding of distributional effects, portfolio dynamics, and system outcomes.