

THE MISSING LINK: Why Dynamic Pricing is Essential in the Switch to Clean Heating

Report

April 2024

1 Summary

The European Commission wrote in its Communication on the 2040 climate target that “electrification with a fully decarbonised power sector is the main driver of the energy transition.”¹ Reducing carbon emissions means removing fossil fuels, so that renewable energy can increasingly take their place, and that can only happen if we electrify sectors like heating or transport. Doing so creates challenges, none more so than the risk of overpressuring the grid if we all consume electricity at the same time, but there are solutions.

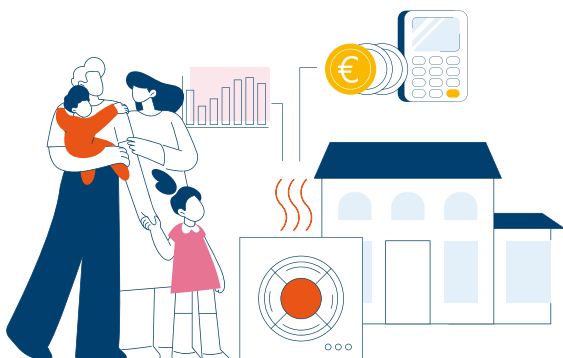
Dynamic pricing offers the potential to shift some consumer use of electricity from peak to off-peak hours, which lowers pressure on the grid. But it is five years since the Clean Energy for All Europeans package made the provision of dynamic pricing offers to consumers by suppliers obligatory, and there are still too few offers out on the market.

This report explores the potential advantages from dynamic pricing offers for consumers and must inspire enforcers and policymakers to make these offers more widespread.

MAIN RESULTS

1. Households equipped with a heat pump benefit greatly from switching to dynamic price tariffs.

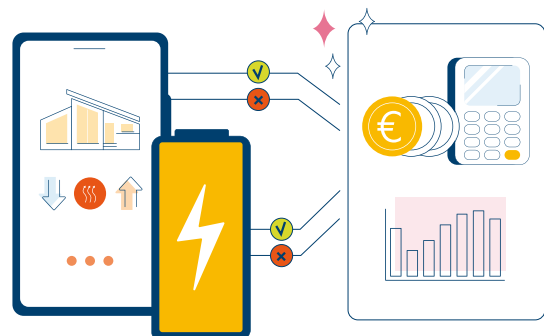
Those in Belgium, Spain and Italy who have a heat pump and switch to dynamic price tariffs can save between **€460-€1,350 per year**.



2. Even when sticking to static pricing, **running a heat pump leads to lower energy bills**. In Belgium, Italy and Spain, consumers can save between **€160-€530 per year** if they switch from a gas boiler to a heat pump.



3. Consumers do not necessarily need to be **equipped with sophisticated technologies** such as smart and automated controls, or batteries to benefit from dynamic tariffs.



4. **The financial risks** of using regular appliances during peak hours **are limited**, as are the risks of unpredictability of prices.



¹EU Commission, ‘Securing our future: Europe’s 2040 climate target and path to climate neutrality by 2050 building a sustainable, just and prosperous society’ (February 2024).

5. The benefits of dynamic prices can **vary significantly between countries**. This is mostly attributable to differences in national taxation levels of electricity.



MAIN POLICY RECOMMENDATIONS

Dynamic prices offer a real opportunity to protect the grid, increase climate action and save consumers money. Public authorities need to swing into action and turn the words of the Clean Energy for all Europeans strategy into reality.

1. It is high time all public authorities, starting with EU Member States, finally make dynamic price offers available to all consumers.
2. Public authorities should adjust their taxation systems to favour dynamic price offers.
3. Consumers should receive trustworthy information about the benefits of dynamic prices offers.

2 Why This Study?

With the EU Green Deal, the European Union has taken strong steps to accelerate its energy transition. In 2021, the share of renewables in EU energy consumption was close to 22%. With the recently revised Renewable Energy Directive and the REPowerEU Plan, this share is supposed to increase to 42.5% by 2030. To fulfil this ambitious objective, our needs to electrify on a massive scale. The car industry is doing so at a fast pace and the share of battery electric cars in the total number of sales has risen from 1% in 2018 to almost 15% last year.² Progress in the heating sector is also impressive with heat pump sales increasing from 1.27 million in 2018 to 3 million in 2022.³

This trend is not only good news for our fight against the climate crisis, it is also an opportunity for consumers. As repeatedly shown in studies, the switch to battery electric cars, heat pumps and renewable energy appliances, and the shift away from a fossil-based energy system has the potential to greatly reduce consumers' bills.

These changes of magnitude do not come without challenges though. One of the main ones is that the switch to renewable energy and the electrification of our economy means our energy system needs to become

smarter and more flexible. We need to move away from a 'rigid' fossil-based energy generation system, where fossil-fuelled power plants such as gas and coal are switched on in case of peaks in demand, to a much more flexible one where demand needs to 'adjust itself' to the moments where renewable electricity is abundant.

For this, electricity demand needs to become more flexible. Concretely, this means that the electricity system of the (close) future will need to increasingly rely on consumers' willingness/ability to shift their electricity consumption to off-peak periods. For instance, the owner of an electric car will need to be encouraged to start recharging their cars at midnight – when electricity consumption strongly decreases - instead of at 7 pm. Or to switch on their heat pumps/air conditioning in the middle of the day, when the sun is shining, rather than early morning and early evening when everyone is making coffee, cooking and watching TV.

The potential benefits of demand-side flexibility for individual consumers and the energy system as a whole have already been the subject of numerous studies and reports.⁴ And so have the risks of consumers not

²Transport & Environment, 'Europe's BEV market defies odds but more affordable models needed', (2024).

³European Heat Pump Association, 'European Heat Pump Market and Statistic Report 2023', (2024).

⁴For instance: SmartEn, 'Demand side flexibility – quantification of benefits in the EU', (2022).

becoming flexible. Policymakers also seem to agree that demand-side flexibility will be a key component of tomorrow's energy system. In its recent communication on the 2040 climate target, the Commission rightly insists that the electrification of our energy system needs to go together with the further development of smarter grids, system integration, demand flexibility and storage solutions and that “consumers should be empowered to adapt their consumption to market conditions.”⁵

And yet, more than five years after the adoption of the Clean Energy Package, which was supposed to make dynamic pricing offers available to every consumer in the EU, not much has changed and too few consumers are engaged in demand-side flexibility.

3 Main Results

HOUSEHOLDS EQUIPPED WITH A HEAT PUMP BENEFIT GREATLY FROM SWITCHING TO DYNAMIC PRICE TARIFFS

Households in Belgium, Spain and Italy which are equipped with a heat pump and switch to dynamic price tariffs can expect to save between **€460-€1,350 per year** compared to a baseline scenario where they are equipped with a condensing gas boiler and are subscribed to ‘static variable tariffs’ (where electricity prices are adjusted but over long time periods, and where they are not immediately indexed to electricity wholesale prices).

Households can hope to reach the higher end of savings (for instance €1,350 per year in Spain or €1,240 in Belgium) in the most favourable scenario. They can do this when they are equipped with a heat pump and an electric car, subscribed to a dynamic tariff contract and using all their appliances in a ‘high flexibility mode’, meaning that the use of the most energy-consuming appliances, specifically EV charging, space heating, air conditioning, and then to a lesser degree but with still substantial savings, hot water heating, dishwashers and washing machines, is scheduled in an optimal way, by for instance turning on your heat pump in the middle of the day when the sun is

Given the importance of switching to renewable energy as quickly as possible and ensuring consumers are informed and protected in this transition, BEUC commissioned a study from LCP Delta to explore the cost differences between running one's home on a dynamic or a static tariff, both with and without electric heating. The study covered the period between July 2021 and June 2022, at a moment of spiralling energy prices in Europe. With this report, we want to shed light on the potential benefits for households of engaging in dynamic tariffs – especially at times of high energy prices – and make some recommendations as to how these offers could finally be made available – and attractive – to consumers.

shining and global electricity demand is reasonable, or heating your water during the night at off-peak times.

One important caveat though is that these savings do not take into account the purchase of the appliance. This might not be a problem for households benefiting from the higher end of the potential annual savings, as saving more than €1,000 would mean that the higher upfront cost of a heat pump compared to a gas boiler is likely to be recovered well before the end of the heat pump's lifespan. However, where savings would be more limited (a few hundreds of euros per year), consumers switching to a higher-end heat pump model (such as air-to-water models) and subscribed to a dynamic price contract would be unlikely to see a return on the initial investment without public support (tax credits or purchase incentives for instance).

EVEN WHEN STICKING TO STATIC PRICING, RUNNING A HEAT PUMP LEADS TO SAVINGS ON YOUR ENERGY BILLS

In Belgium, Italy and Spain, consumers can save between **€170 – €720 per year** on their heating bill if they switch from a gas boiler to a heat pump, even with a static

⁵European Commission, ‘[Communication on the 2040 climate target](#)’, (February 2024).



electricity tariff. The caveat described in the section above on the possibility to see a return on the initial investment for a heat pump applies even more strongly here as the potential benefits of switching to a dynamic tariff offer do not materialise.

**BENEFITS OF SWITCHING TO DYNAMIC PRICES
TARIFFS ARE THE BIGGEST FOR HOUSEHOLDS
LIVING IN INDIVIDUAL HOUSES AND WHO DRIVE
AN ELECTRIC CAR**

The higher your electricity consumption, the more you benefit from a dynamic tariff. Logically, consumers living in ‘semi-detached’ houses, who consume more electricity than those who live in apartments, and who are equipped with a heat pump and a battery electric car, are best placed for significant savings. This is indeed the scenario under which households benefit the most. In Spain for instance, a consumer living in an individual house who also owns an electric car could save with a dynamic tariff up to 38% on their energy bills compared to a scenario with gas boilers/ no EV/static tariffs.

**THE BENEFITS OF DYNAMIC TARIFFS ARE NOT
LIMITED TO “DIGITALLY SAVVY” CONSUMERS,
MANAGING YOUR ELECTRICITY CONSUMPTION
MANUALLY ALREADY DELIVERS SIGNIFICANT
SAVINGS**

To benefit from dynamic tariffs, consumers do not necessarily need to be equipped with sophisticated technologies such as smart and automated controls, residential batteries and/or home electricity generation, such as solar panels. In Italy, Belgium and Spain, consumers can also ‘manually’ schedule the operation of the most

energy-consuming appliances (such as electric cars’ charging, dishwashers etc.) at times of the day where wholesale electricity prices are *usually cheaper*, as opposed to using a more technological solution such as a digital interface in a smart home or an app. This is in most cases sufficient to unlock most of the benefits of switching to dynamic tariffs. For instance, Belgian consumers on dynamic tariffs who schedule the operation of their heat pump ‘manually’ can expect savings between 15% and 20% already compared to the baseline scenario (gas boiler/ static variable tariffs).

**THE FINANCIAL RISKS OF USING REGULAR
APPLIANCES DURING PEAK HOURS ARE LIMITED**

Leaving electric cars and heat pumps aside, the savings stemming from operating other devices (e.g. washing machines) flexibly are modest, but still worthwhile (1-5% in the countries considered). Conversely, consumers should not fear getting hit with high bills if they cook or wash their clothes at peak times as our research shows that doing so does not entail significant risks of high bills. This is because, as BEUC had also shown in a report on the financial benefits of Ecodesign⁶, the energy consumption of dishwashers, cooking appliances or lighting is relatively modest compared to heating or charging an electric car. Even without a flexible use of heating and air conditioning, dynamic tariffs still lead to savings.

**THE RISKS OF UNPREDICTABILITY OF PRICES IS
ALSO RATHER LIMITED**

Consumers worry about dynamic prices leading to unpredictable and high bills. However, our research showed that while dynamic tariffs do see the impacts of

⁶BEUC, ‘Energy-saving appliances: the silent money maker in consumers’ homes’ (2024).

price hikes more quickly than static tariffs, they also fall more quickly in terms of price. In essence, consumers pay more for a static tariff as the protection against volatility is baked into the price.

BENEFITS OF DYNAMIC PRICES CAN VARY SIGNIFICANTLY BETWEEN COUNTRIES AND THAT'S MOSTLY ATTRIBUTABLE TO DIFFERENCES IN NATIONAL TAXATION OF ELECTRICITY

Although beneficial in all three countries, switching to dynamic tariffs is clearly more attractive in Spain and Belgium than in Italy. The reason is that in Spain, the government capped wholesale prices in the context of the energy crisis, through the so-called Iberian mechanism, hence also capping dynamic retail tariffs. In Belgium the very low level of competition, with only a handful suppliers remaining on the market during that period drove retail prices up. In Italy, if dynamic retail tariffs had been available, consumers would still have made significant savings of around €40 per month, despite the Italian electricity retail market remaining a very competitive market throughout the period, which was considered in the analysis.

HUNGARY IS THE ONLY COUNTRY IN THE STUDY WHERE CONSUMERS WOULD MASSIVELY LOSE OUT FROM SWITCHING TO DYNAMIC TARIFFS (IF THEY WERE OFFERED)

Hungary is the exception in our research. It is the only country out of the four covered where consumers would have lost out massively if they had switched from static to dynamic tariffs. Had dynamic price offers been available in Hungary, households would have been very ill advised to leave their static tariffs and switch as it would have resulted in an increase of the energy bill ranging between €1,460 and €1,900 per year. Replacing a gas boiler by a heat pump in Hungary – even without switching to a dynamic tariff – would also not have been a wise financial decision as it would have led to an almost 50% increase in a household's annual energy bills.

The reason for this difference is that, under the considered period, fixed price electricity tariffs were massively subsidised by the Hungarian government while dynamic tariffs, by their nature, would have remained pinned to wholesale markets. What's more, regulated gas prices also meant that a heat pump was more costly to run than a gas boiler. Making demand more flexible in Hungary does not come close to compensating for these extra costs.

4 What does this mean for policy?

With the notable exception of Hungary, it is clear that consumers could benefit from switching from static/variable contracts to dynamic ones, especially when combining them with a heat pump and/or an electric car. Numerous studies and reports also demonstrate the benefits at system level of this switch at a moment where we are quickly increasing the share of renewable energy in our mix and electrifying key consumption areas, such as heating and mobility. And yet, still too few consumers engage. What needs to happen to correct that course and make sure that people can finally access to – and benefit from – dynamic prices offers?

IT IS HIGH TIME ALL PUBLIC AUTHORITIES, STARTING WITH EU MEMBER STATES, FINALLY MAKE DYNAMIC PRICE OFFERS AVAILABLE TO ALL CONSUMERS

The 'good' news is that consumers are already entitled to dynamic price contracts thanks to the Electricity Directive (2019/944). The bad news is that fewer than half of EU Member States are currently offering these contracts to consumers at all.⁷ This is because many Member States have failed to implement the provisions of the penultimate revision of electricity market rules (generally referred to as the "Clean Energy Package") which entitle all final consumers who have access to a smart meter to be able to sign up

⁷ACER-CEER, ['Energy Retail and Consumer Protection. Market Monitoring Report'](#) (2023).

to a dynamic electricity price contract with at least one supplier in their market. Alas, close to five years after the adoption of this package, the national transposition of these provisions is missing which means many European consumers willing to engage in demand-side flexibility are simply not offered the possibility to do so. The recently concluded revision of electricity market rules (the ‘Electricity Market Design reform’ or EMD) went even further than the Clean Energy Package in offering consumers the right to have multiple electricity contracts at the same time. This is a good development which will further help consumers willing to engage and who might be tempted for instance to switch to a dynamic price contract only for their heat pump and/or their electric car and stick to fixed prices for the rest of their consumption. Other important legislation of the Fit for 55 package also presents new opportunities with regards to the expansion of demand-response offers.

- When transposing the EMD in their national law, Member States which failed to do so should also make sure they implement the provisions of the Clean Energy package giving consumers the possibility to switch to dynamic tariffs.
- The European Commission should communicate much more widely about the importance of demand-side flexibility for consumers and the energy system as a whole. Demand-side flexibility should be mentioned in every relevant Commission’s initiative, starting with the delayed Heat Pump Action Plan which is now scheduled for late 2024/early 2025.
- Member States should take advantage of the recently adopted energy efficiency laws (the Energy Efficiency Directive – EED - and the Energy Performance of Buildings Directive) to further promote demand-side flexibility. Under the new EED, companies responsible of the management of the energy grids – also known as Distribution System Operators (DSOs) – can now be subject to “energy efficiency obligations schemes” as obligated parties. This means that they may have to facilitate measures to help the final customers reaching quantifiable energy efficiency savings targets. DSOs, as infrastructure managers, have a prime interest in making sure the grid functioning is optimised. They shall be Obligated Parties and incentivised to roll out demand-side

flexibility more actively as part of their new obligations under the Energy Efficiency First Principle (EED). Under the new EPBD, the roll-out of electric car charging points in buildings will be accelerated, fostering demand-side flexibility ready infrastructure in the EU building stock.

PUBLIC AUTHORITIES SHOULD ADJUST THEIR TAXATION SYSTEMS TO FAVOUR DYNAMIC PRICES OFFERS

As the Hungarian case shows, the broader public policy choices in the energy sector have a decisive impact on whether the switch to dynamic prices is beneficial or not for consumers. When final energy prices are heavily subsidised and consumers protected through a price cap, switching to dynamic tariffs – even in the most favourable setting (heat pump, EV, good insulation, high flexibility) – does not make financial sense for people. This is because subsidised energy prices are artificially maintained below their market price while dynamic prices are by definition attached to real-time market prices and therefore do not offer the same degree of protection.

The debate on whether energy tariffs should be subject to a price cap or not goes of course way beyond the remit of this paper. Considering energy as a public good, where prices should be closely controlled by public authorities, is a position that has its merits. One can wonder however whether heavily subsidising expansive price caps protecting all consumers – independent of their revenues and level of energy consumption – is the most cost-effective and system-efficient option. The Hungarian government’s decision to cap energy prices horizontally led to a cost of €6.37bn between September 2021 and January 2023, equal to €1,500 per household.⁸ While these short-term measures were probably difficult to avoid at the midst of the energy crisis, this money could in the long-run be better spent on more structural measures, such as supporting housing renovation or the switch to heat pumps and/or providing targeted support to those households who need it the most (through social tariffs for instance).

To make dynamic price tariffs financially attractive, a broader system change is therefore needed: taxes on electricity should be reduced and compensated by higher taxes on fossil fuels – such as gas (while providing strong social safeguards). Rather than horizontally applying

⁸Bruegel, ‘National fiscal policy responses to the energy crisis’, (2023).



energy price caps making the switch to dynamic tariffs unattractive, Member States should encourage consumers to switch to dynamic tariffs.

CONSUMERS NEED TO BE HELPED/ENCOURAGED TO SWITCH FROM PETROL AND DIESEL VEHICLES TO ELECTRIC CARS AND FROM FOSSIL-FUEL BOILERS TO HEAT PUMPS

The study clearly demonstrates that benefits of dynamic tariffs are maximised when consumers are equipped with heat pumps and electric cars. Of course, not every household needs an individual car and there exists other sustainable forms of heating than heat pumps (such as renewable based district heating). But many consumers – such as those living in rural/periurban areas – are still very often relying on individual heating solutions and cars. For them, replacing their gas boiler with a heat pump, substituting their diesel or petrol car with an electric one and switching to dynamic tariffs would be an ideal scenario in many countries.

For this to happen though, we need strong public policies that support consumers in the switch at least until the price of these clean technologies will decrease more significantly (a trend which is already starting for electric cars⁹). This is needed because even if the study shows that consumers can expect a return on investment of the combined switch to EVs, heat pumps and dynamic tariffs, many simply cannot afford the upfront investment yet.

Helping consumers will go through a mix of supply-side regulations – such as car CO₂ targets or further

Ecodesign requirements on the energy efficiency of heating appliances – and of support mechanisms aimed at helping consumers – especially lower and middle income ones – afford the switch. The generalisation of dynamic price tariffs should therefore be seen as one of the pieces of the energy transition puzzle.

CONSUMERS SHOULD RECEIVE TRUSTWORTHY INFORMATION ABOUT THE BENEFITS OF DYNAMIC PRICES OFFERS

In markets where dynamic electricity price contracts or aggregation contracts have only started to appear, consumers often are sceptical about them because they do not know what the potential benefits are. In addition, as shown by one of BEUC’s British members Citizens Advice¹⁰, consumers fear they might be exposed to unpredictable and very varying prices which could lead to unmanageable electricity bills. While our own research shows this risk was very limited, it is important to reassure consumers about what they can expect from switching to this kind of offers. To address this, precontractual information provided by suppliers and comparison tools is a key tool to nudge consumers. Today unfortunately, the information that consumers receive, including on conventional offers, is confusing and does not allow consumers to make a conscious choice. In line with the Gas Directive and the Electricity Market Design reform, the Commission will need to issue guidance for Member States on precontractual information. It is critical that the upcoming Commission’s guidance document is based on actual consumer research, so that the transposition leads to information that is easy to understand for consumers.

⁹<https://europe.autonews.com/automakers/smaller-ev-prices-seen-falling-combustion-engine-levels-first>

¹⁰Citizens Advice, ‘A flexible future : extending the benefits of energy flexibility to more households’ (August 2023).

WITH THE SUPPORT OF AUTOMATED TOOLS, IT SHOULD BE MADE EASY FOR CONSUMERS TO ENGAGE IN DYNAMIC PRICE OFFERS

Our research shows that consumers did not necessarily need sophisticated digital tools to benefit from dynamic price offers. 'Manually' adjusting the operation of most energy-consuming devices to off-peak times can already unlock the main savings. During the energy crisis, we saw many consumers making use of the apps, allowing them to monitor at what time prices were lowest and shifting their energy consumption accordingly. In the long run however, the industry should roll out technologies helping consumers to benefit from offers remunerating flexible consumption. We can indeed expect that consumers will engage systematically only with the help of automated products or services. Wide adoption of smart heat pumps, smart thermostats or even apps automatically scheduling EV charging at those times when electricity prices are the lowest, or when consumers are remunerated for their flexibility, will be key.

AUTOMATION MUST BE TRUSTWORTHY AND INCLUSIVE

Consumers are willing to delegate control to automated products/appliances, as long as it is easy, and they know that the product will satisfy their needs. Easiness is important because four out of ten adults still lack basic digital skills. Obviously digital education is needed, but first and foremost, tools need to be easy to use for all consumers across generations and educational backgrounds.

Consumer also must be able to revert automated decisions. Consumers should for example be able to set a time at which their EV should achieve a minimum level of charge. Consumers should also be able to revert automated decisions if they have a special need, without incurring too high a financial penalty. This must for example be ensured for people who may need a higher temperature in their home in case they fall sick.

5 Methodology

While the whole methodology is available in the [LCP Delta study](#), a few elements are important to consider here in terms of the main assumptions/modelling:

- **Geographical coverage:** this report covers four countries (Italy, Spain, Belgium and Hungary). Dynamic tariffs offers are not actually available to consumers in all of them however (see more in the policy recommendations section below). Where it was the case, LCP Delta simulated what a dynamic tariff offer could look like.
- **Choice of housing:** we selected four housing archetypes in each country: a 70 m² apartment and a 100 m² semi-detached house. Housing was considered to have an average insulation level typical of the country covered and each of the housing archetypes was considered either equipped with a condensing gas boiler or a heat pump.
- **Choice of energy consumption patterns:** homeowners are modelled to have 18 energy efficient devices corresponding to an average household equipment.

Four use case scenarios were explored: from the 'classical' static tariff many consumers are subscribed to, to different levels of dynamic tariff optimisation (from high flexibility, where the use of appliances is optimised to take full advantage of peaks and lows in wholesale prices, to low flexibility, where several appliances run at peak time).

- **Period covered:** the study took as a basis energy prices from July 2021 to June 2023, which correspond to the middle of the energy crisis in Europe. This was a period marked with very strong increases in electricity static tariffs and was therefore more favourable to dynamic prices which could adjust in real time to drops in wholesale tariffs. This means that the study probably looks slightly more favourable to dynamic tariffs than if it had been conducted more recently. However, we argue that financial benefits of dynamic prices would materialise anyway for consumers, even when considering more reasonable energy prices.

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