

Why flexible consumers matter

A contribution to EU elections 2024



Geopolitical instability and wars in Europe and neighbouring countries have exposed the weaknesses of an EU energy system still relying on imported fossil fuels.

Electricity prices peaked at €474/MWh in August 2022 and fell to an average of €107/MWh from January to June 2023- still much higher than pre-crisis level.

This has increased **vulnerability** and **costs for both citizens and industries** in Europe, who find themselves victims of energy geopolitics and an ever persisting energy system relying on fossil fuels.

The **solution** to prevent such crises with harsh social and economic consequences from happening again is well known:



MORE RENEWABLES

Clean electricity generation from renewable energy sources must increase, to substitute fossil fuel supply.



INCREASED ENERGY EFFICIENCY

Energy savings through energy efficiency must grow, to reduce energy needs to the minimum.



MORE DEMAND-SIDE FLEXIBILITY

All consumers must be able to adjust their own energy consumption and generation in a time-dependent way, reacting to energy price fluctuations and the needs of the energy system, including the local energy community they opt to be a part of.

Only a clean energy transition built on all these 3 pillars will be efficient and impactful to make Europe stronger.

We cannot lose time. We need to **accelerate** the pathway for full resilience and climate neutrality.



Did you know?

Demand-side flexibility (DSF) refers to the **capability of any active customer to react to external signals and adjust their energy generation and consumption** in a dynamic, time-dependent way, individually as well as through the support of energy service companies (aggregators).

Demand-side flexibility can be provided by smart **decentralised energy resources (DERs)**, such as demand management, energy storage, smart and bidirectional electric vehicles and distributed renewable generation to support a more reliable, sustainable and efficient energy system.

We need to use renewable electricity in our buildings, cars and industries. This process is called **electrification**.

The mere electrification of our energy system is not enough. Increasing targets and volumes of renewable electricity production is crucial, but we must address the grid congestion issues that would result from a rapid growth in variable renewable generation and electricity consumption. Otherwise it will simply result in more costs, for both citizens and the society at large.



Did you know?

- All modelling shows the **rate of electrification** of Europe's energy use will need to reach **58% to 71% by 2050** to deliver a climate neutral energy system¹.
- By **2030**, Europe will see around **50 to 60 million heat pumps**, **65 to 70 million electric vehicles** embedding around **3TWh of batteries** and over **600 gigawatts** of additional renewable capacity². Around **70%** of that **capacity** will be directly connected to **distribution grids**³.
- In some areas, **grids are already under stress**, struggling to handle the pace of electrification such as in the Netherlands⁴ due to the rise of EVs and the demand for residential electricity or in Poland, where between 60 to 80% of consumers are denied a connection with the grid⁵.
- Due to the weather-dependent nature of renewables, the energy system will need to increase its flexibility to integrate this clean energy. As these fluctuations happen throughout a day, **the energy system needs to increase its daily flexibility by 133% in 2030**. And from 2030 to 2050, a further increase by 250% on average is required in the EU⁶.

SMART ELECTRIFICATION IS REQUIRED

Boosting electrification of our buildings, vehicles and industries without leveraging their inherent flexibility to adjust their consumption in a time-dependent way would simply result in unsustainable costs for all.

If not done smartly, achieving climate neutrality will be a burden for citizens and industries and will be very expensive for the society at large.

In 2050, when looking back at how we started this crucial process towards climate neutrality, will we be able to state it was done in a cost-effective and efficient way, with consumers onboard?

Smart electrification builds on the digitally-enabled and automated, active participation of energy consumers to address the impacts of an increasingly variable renewable energy system.

¹ Electrification Alliance Manifesto <https://windeurope.org/wp-content/uploads/files/policy/position-papers/20231017-Electrification-Alliance-Manifesto.pdf>

² European Commission, RepowerEU Plan.

³ Eurelectric, [Power System of the Future](https://www.eurelectric.org/en/Power-System-of-the-Future)

⁴ <http://www.alliander.com/en/financial-news/electricity-network-in-residential-areas-is-approaching-maximum-capacity>

⁵ Polska Grupa Energetyczna (PGE), Polish Association of Professional Heat and Power Plants, 29 June 2023.

⁶ European Commission, Staff Working Document accompanying the Reform of the Electricity Market Design.



“Reducing demand during peak hours will make supply last longer, and it will bring prices down”⁷

Ursula Von der Leyen,
European Commission President State of the Union 2022

THE FLEXIBILITY OF MILLIONS OF SINGLE CONSUMERS - BE THEY A HOUSEHOLD, A VEHICLE, AN SME OR A LARGE INDUSTRY - CAN MAKE THE DIFFERENCE.

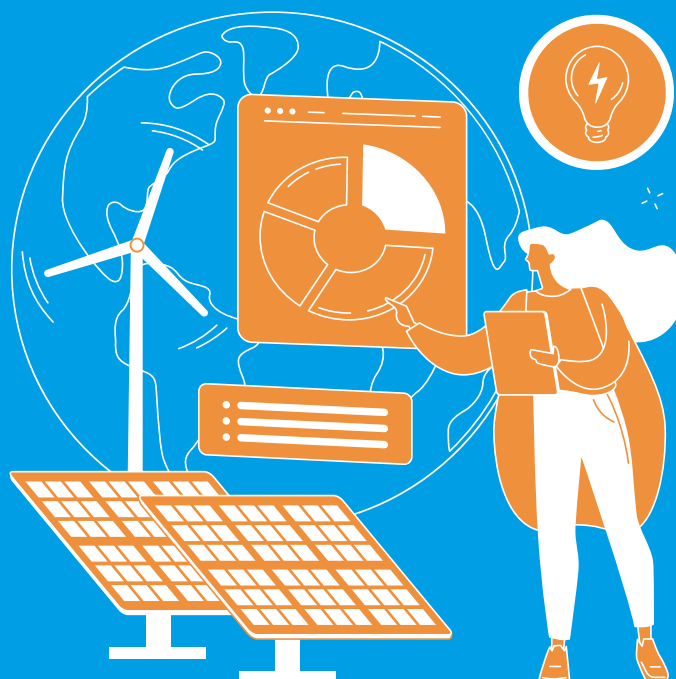
Active consumers and **prosumers** have a pivotal role to play for an efficient acceleration of the clean energy transition to increase the security, competitiveness and resilience of the EU economy and society.



Did you know?

Active consumer is a household, an SME or large industry that can adapt its energy consumption in a time-dependent way. It differentiates from a **passive consumer** that simply uses energy without having the possibility to adapt it in response to price fluctuations, external incentives and carbon intensity.

Prosumer is both a consumer and a producer of renewable energy. They can self-consume their own electricity production, sell-it to the grid or share it with other consumers.



If all consumers unleash their flexibility, tangible benefits and cost savings are achieved in 2030 in the EU.

15.5 TWh could be avoided in **renewable energy curtailment**, which is a **61%** improvement compared to if no action is taken. For comparison, the generation from gas-fired plants in Belgium in 2023 amounted to 19.2 TWh.

60 GW of **peak generation capacity** could be avoided, equivalent to 137 gas peaking plants, resulting in **€2.7 billion savings** annually.

Between **€11.1** and **29.1 billion** can be **saved annually** in distribution grid reinforcements through a smart and active management of grid-edge, flexible consumers.

EACH INDIVIDUAL CONSUMER BENEFITS FROM DEMAND-SIDE FLEXIBILITY, NOT JUST THE SOCIETY AT LARGE.⁸

- Consumers with flexible assets could **save more than €71 billion on their electricity bills every year** by 2030.
 - This will **increase the return on investment** for the purchase of flexible assets and reduce the operating costs of smart heat pumps in our homes or offices, electric vehicles, or e-boilers in energy intensive industries.
 - While the investment in an electric vehicle, a heat pump or an e-boiler cannot be afforded by all, the flexibility offered by those consumers with these smart assets **would bring benefits for everyone** and not just those able to afford them.
- By 2030, €300 billion in annual indirect benefits can be unlocked for all Europeans, resulting in lower wholesale prices, less exposure to extreme price volatility and reduced system costs, benefitting all consumers.

DEMAND-SIDE FLEXIBILITY IS ALREADY A REALITY

Solutions are ready, proven and scalable. Some volumes of controllable energy consumption across Europe are already activated. This is not a futuristic scenario. The untapped potential is huge and growing exponentially.

The **flexible demand management industry** represented by smartEn's 100 member companies offers a broad range of **technologies and services** to realise this vision: ensuring that all citizens and industries in Europe can **actively contribute to the clean energy transition while being rewarded for doing so.**

Our sector offers:

- Digitally-connected devices in buildings that can be controlled remotely.
- Electric vehicles that can store energy and recharge when power is abundant, green and cheap, and discharge it when energy is scarce, grey and expensive.
- Digital solutions to energy intensive industries to adjust consumption and store clean electricity to reduce their energy bills.

There is a vast set of small-scale, distributed and decentralised energy resources – precious flexible assets in a decarbonised reality.

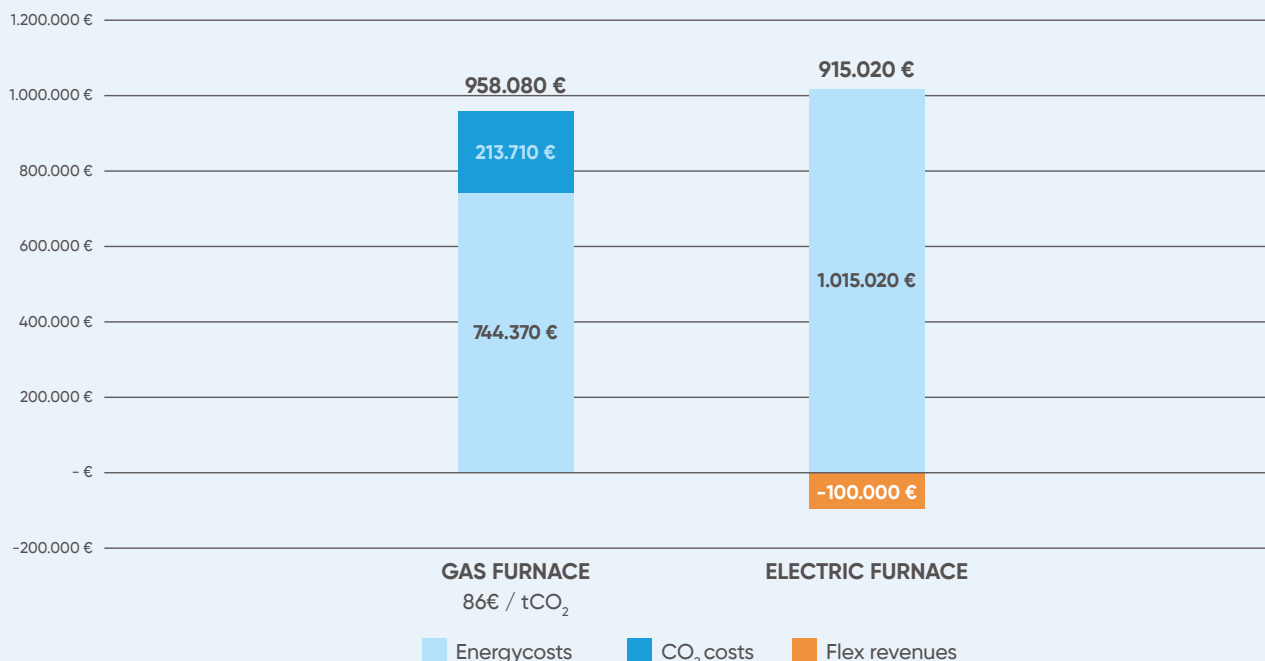
⁸ Demand-side flexibility in the EU: Quantification of benefits in 2030, September 2022-
https://smarten.eu/wp-content/uploads/2022/09/SmartEN-DSF-benefits-2030-Report_DIGITAL.pdf

CONSUMERS CAN ALREADY BENEFIT FROM THE ACTIVATION OF THEIR FLEXIBILITY, BUT STILL IN LOW VOLUMES

Industrial electrification: Flexibility revenues crucial for a competitive advantage to gas



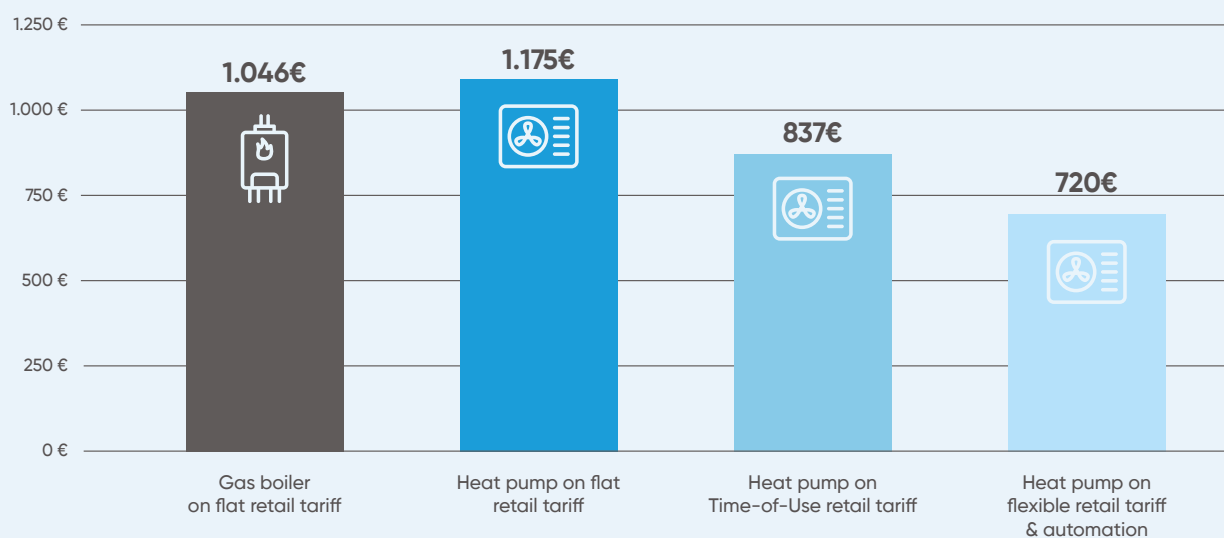
Energy costs for 2MW furnace production



Heating our homes: Gas VS Heat pump running costs in the UK



Running Cost (EUR/year)

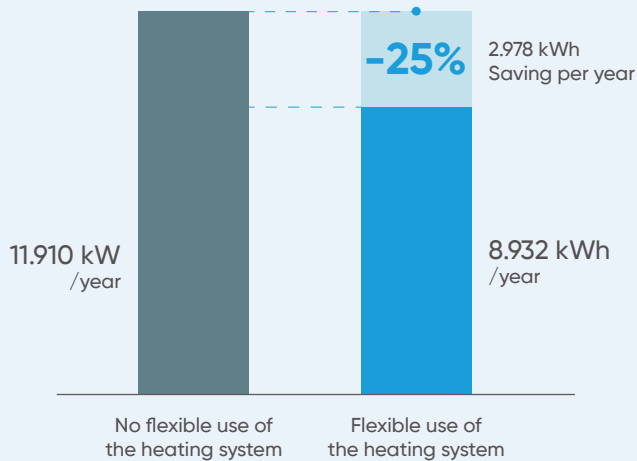


Tariff descriptions: The smart charging tariff is based on Intelligent Octopus Go, a managed EV tariff, where customers provide Octopus with their charging requirements, and Octopus uses its Kraken platform to optimise the charging pattern and lower costs. Customers can always override the control. The bidirectional charging tariff is based on a V2G tariff, an intelligently managed version which discharges at peak, and imports at off-peak to lower costs for the customer. Savings on V2G tariff are based on modelled usage at current energy prices.

Tariff descriptions: The ToU tariff is based on Cosy Octopus, a 3-rate tariff for heat pump owners with a standard day rate, two off-peak rates from 04:00-07:00 and 13:00-16:00, and a peak rate between 16:00-19:00. The flexible retail tariff is based on the Intelligent Octopus Cosy, a managed version, where Octopus steers the heat pump within the heating envelope specified by customers, using their Kraken platform to optimise its behaviour and lower costs. Customers can always override the control. Savings are based on modelled usage at current energy prices.

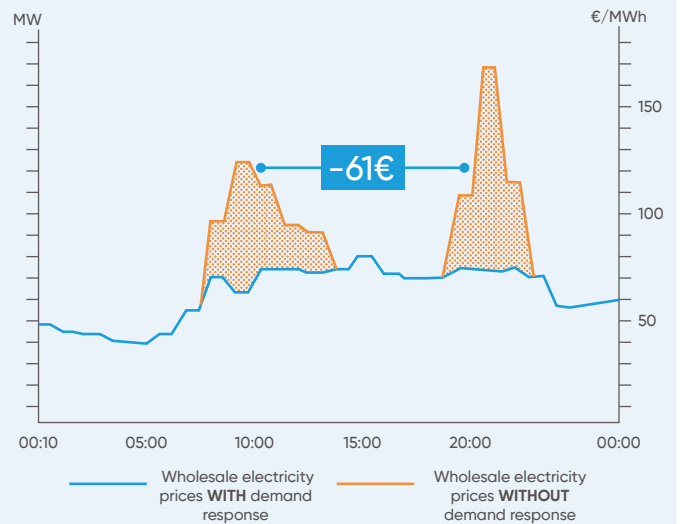
Consumers can save up to 25% of their energy consumption per year thanks to smart heating devices

Average heating consumption / year

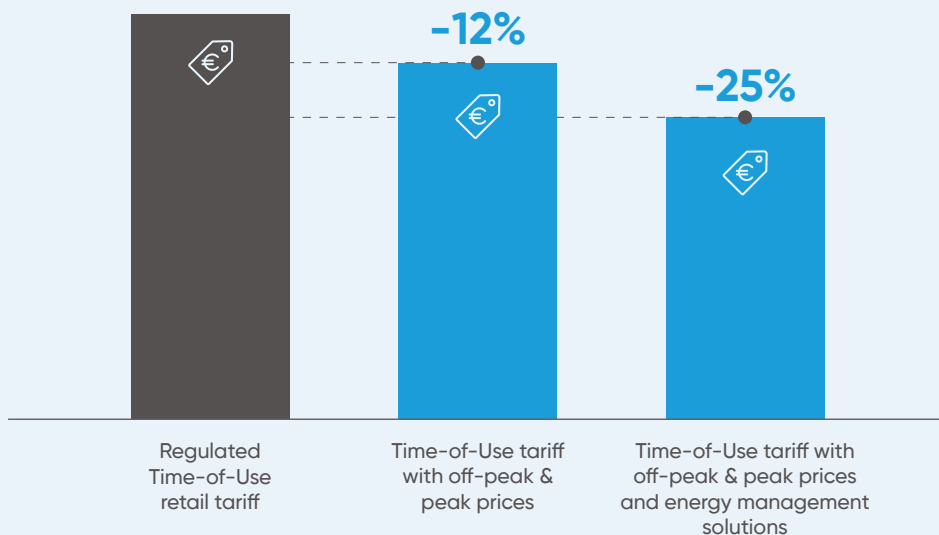


The electricity consumption in kWh is about 18.045 for a 100m² house heated with electricity.

The participation of demand response in wholesale markets can reduce peak electricity prices in France by 61€/MWh on average



Average annual savings on the electricity bill for a flexible household



Consumers with Time-of-use tariffs based on off-peak/peak-price, introduced by EDF, can get -20% on the off-peak kWh price compared to the regulated tariff for off-peak kWh price, during most days of the year. During peak days, peak kWh price is 3 times higher than the regulated tariff for peak kWh price.

WHY IS THIS NOT SURGING NOW?

A **set of clearly identified barriers** hinders the full activation of the distributed flexibility from consumers across Europe.⁹

For example, most consumers do not have or are not incentivised to adopt real-time price signals in their electricity retail tariff so they cannot adapt their consumption in light of price fluctuations. This limits consumers' choice.

In some countries, service providers, namely aggregators, are not allowed to participate in electricity markets. As a result, they cannot present to consumers their market offers to activate their flexibility for free and in an automated manner, helping them to reduce their electricity bills. This limits once again consumer choice and reduces competition.

MOST OF THESE BARRIERS HAVE ALREADY BEEN ADDRESSED BY EU LEGISLATION. NOW IT'S TIME TO ACT!



In the past 7 years EU policymakers have shaped laws for a comprehensive framework on consumers' empowerment- one of the best in the world.

National implementation of existing EU regulations should happen now across Europe to unlock the distributed potential of flexibility and unleash the benefits active consumers could reap for themselves and for the society.



"Transposition should not be delayed due to the current crisis, but accelerated."¹⁰

Kadri Simson,
European Commissioner for Energy Smart Energy Summit 2023

The gap between Brussels, its citizens and businesses must be reduced as a matter of priority.

The new EU legislature should deliver concrete results by the end of its next mandate, by 2030.

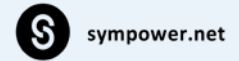
Climate neutrality is a journey that should not leave anyone behind, and should allow all to contribute and benefit from it.

⁹ Demand response and other distributed energy resources: what barriers are holding them back? 2023 Market Monitoring Report, ACER: https://www.acer.europa.eu/sites/default/files/documents/Publications/ACER_MMR_2023_Barriers_to_demand_response.pdf

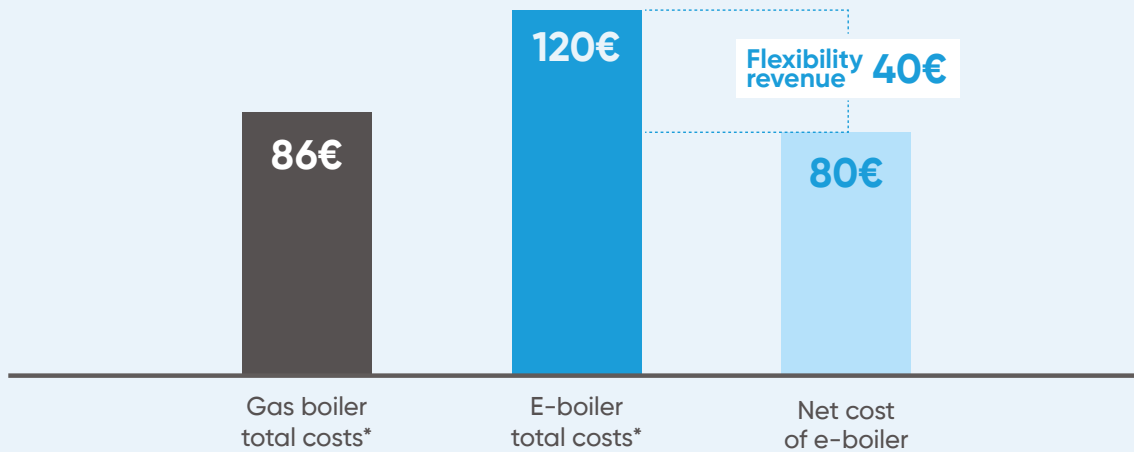
¹⁰ https://ec.europa.eu/commission/presscorner/detail/en/speech_23_2367

IF ALL BARRIERS ARE REMOVED IN THE SHORT TERM, CONSUMERS CAN GET MORE BENEFITS FROM THE ACTIVATION OF THEIR FLEXIBLE ASSETS

Industrial processes: Flexibility revenues can fund the switch from gas to electricity

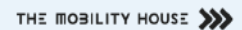


Comparison of cost to produce 1 MWh_{th} of heat in Europe¹ in EUR / MWh_{th}

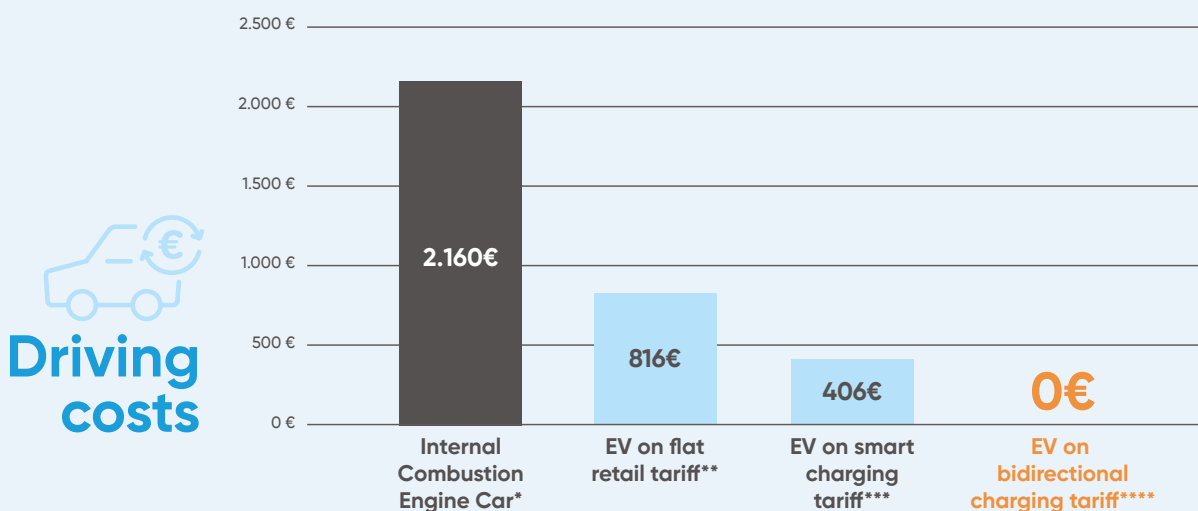


* Total costs cover Capex, Electricity, Gas, ETS carbon price, Other Opex, Flex revenue estimate, Net costs of e-boiler.
 Note: Values of costs & flexibility revenue are “realistic data” based on extrapolation of analysis based on real data. In particular, electricity & balancing market prices have been normalized vs. extraordinary year 2022 (for BM price, used 60% of 2022 real prices). Flexibility revenue generalized across a sample of programs. Actual revenues can differ per country & program.
¹ Fuel price per MWh | Natural gas 55EUR, electricity 100EUR. For a new installation project and for 6,000h of heat supply per year / Source: Agora Industrie, Sympower analysis.

With the right regulatory framework, driving costs can be down to zero for bidirectional charging

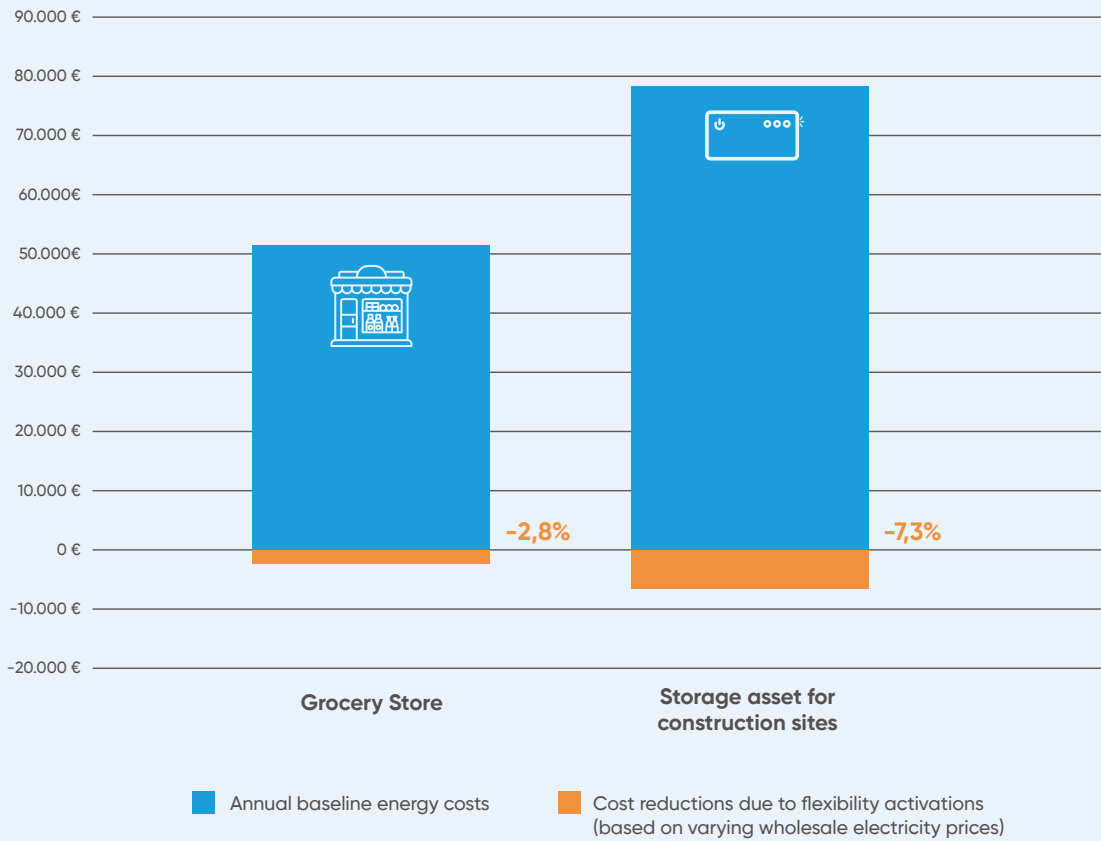


Driving costs: Internal Combustion Engine vs. a smart/bidirectionally charged EV



* 15.000 km/a, average consumption: 7.7 l/100km, 187 ct/l E10 (sources: Statista, ADAC, 01.2024); CO2 emission = tailpipe.
 ** 15.000 km/a, consumption: 16kWh/100km, electricity price: 34 ct/kWh (sources: ADAC, average energy tariff in 01.2024).
 *** 10ct saving for energy smart charged kWh (source: eyond from The Mobility House): 24 ct/kWh, plus DSO services (controllable load par.14a); (source/Details CO2: The Mobility House).
 **** Provided that the right regulatory framework is in place, including access to all markets and the removal of double taxation, an EV on bidirectional charging tariff that intelligently discharges at peak and imports electricity at off-peak can create free EV charging for customers.

Flexible demand: possible electricity cost reductions for commercial buildings and storage assets



The energy storage facility is providing electricity to construction machines (digger, dumpers, cranes) on a specific construction sites with an annual electricity consumption of 41,5 MWh/yr.
 The grocery store is a typical one in Norway with an with annual electricity consumption 263MWh/yr.



smartEn is the European business association integrating the consumer-driven solutions of the clean energy transition. We create opportunities for every company, building and car to support an increasingly renewable energy system. Our membership consists of the following companies:



The positions expressed in this document represent the views of smartEn as an association, but not necessarily the opinion of each specific smartEn member.

For further information about smartEn, please visit www.smarten.eu