



WHITE PAPER

CONSUMER PROTECTION AND EMPOWERMENT FOR A CLEAN ENERGY FUTURE



**CONSUMERS
INTERNATIONAL**

COMING TOGETHER
FOR CHANGE

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ABOUT CONSUMERS INTERNATIONAL

Consumers International is the membership organisation for consumer groups around the world. We believe in a world where everyone has access to safe and sustainable goods and services. We bring together over 200 member organisations in more than 100 countries to empower and champion the rights of consumers everywhere. We are their voice in international policy-making forums and the global marketplace to ensure they are treated safely, fairly and honestly. We are resolutely independent, unconstrained by businesses or political parties. We work in partnership and exercise our influence with integrity, tenacity and passion to deliver tangible results.



ABOUT ENEL FOUNDATION

Established in early 2012, with the key objective to drive changes through knowledge creation and sharing to help solve the greatest challenges of our time in the energy and climate domains, Enel Foundation is an Italian think-tank non-profit.

Based in Rome and Santiago, Enel Foundation conducts in-depth independent research leading to scenarios analysis and specific solutions and co-creates multi flags training programs at the crossroads of climate change and energy transition.



ABOUT ACE RESEARCH

ACE Research is an internationally respected research unit delivering cutting-edge policy research across the decentralised energy sector.

As a core team within the Association for Decentralised Energy (ADE), ACE Research works closely with policy-makers and sectoral stakeholders to supply the best available evidence and insight to the ADE team and others working on decentralised energy policy and practice. ACE Research is widely recognised for their work for national, regional, and local government, as well as industry, consumer, and academic stakeholders.

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ABBREVIATIONS

ACCII	Advanced Clean Cars II
ARERA	Italian Regulatory Authority for Energy, Networks and Environment
CARB	California Air Resources Board
CLEAN	Consumer-Led Energy Action Network
CO ₂	Carbon dioxide
DSO	Distribution System Operator
EEP Africa	Energy and Environment Partnership Trust Fund Africa
EPC	Electric pressure cooker
ESMAP	Energy Sector Management Assistance Program
EU	European Union
EUR	Euro
EV	Electric vehicle
GW	Gigawatt
GWh	Gigawatt-hour
HEMS	Home Energy Management Systems
ICE	Internal combustion engine
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
ISO	International Organization for Standardization
kW	Kilowatt
kWh	Kilowatt-hour
LPG	Liquefied petroleum gas
PACE	Property Assessed Clean Energy
PV	Photovoltaic
R-COOL	Rwanda Cooling Initiative
SDG	Sustainable Development Goal
TWh	Terawatt-hour
U4E	United For Efficiency
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
USD	US dollar

EXECUTIVE SUMMARY

Putting consumers at the centre of the energy transition is vital to meet climate change and affordable, secure energy access goals in conjunction. This is now more important than ever, as consumers around the world face unprecedented price pressures generated by fossil fuel dependence and triggered by the turmoil resulting from Russia's invasion of Ukraine. Today's twin challenge is to help consumers through present difficulties while enabling a rapid transition that secures inclusion, sustainability and affordability in the shortest timeframe possible. The costs of inaction is and will be more and more severe, both to people and the planet. The opportunity to leverage currently available tools to meet both goals at the same time is well within our reach.

Currently, the various policies and regulations that frame the energy market, and the offers for consumers in this market, lag behind in meeting this twin challenge, partly because they have not been designed from the point of view of the energy user – although we have seen quick and effective reactions in some countries in both public and private realms to shield consumers from turmoil. This paper is a first step in changing this. It discusses the barriers that consumers face to changing the way they use energy towards more sustainable models and examines how improved consumer protection and empowerment can help to overcome these barriers and achieve a faster energy transition.

We use the framework of the 'consumer journey' to examine the barriers to action at each stage of a consumer's interaction with energy-related technologies and services, so that the role of improved consumer protection and empowerment can be examined. We focus on three types of energy services: home heating and cooling; cooking; and transport. Linked to these three types of energy services, we look at three types of action that consumers can take: choosing clean energy supply; buying and using buildings and appliances; and becoming more actively engaged with the energy system.

This is an initial examination of these issues and is not intended to be comprehensive. Rather, it raises a series of opportunities for action and illustrates these with specific examples from a range of countries with differing socio-cultural contexts and energy challenges (Brazil, Chile, Italy, Pakistan, Romania, Rwanda, South Africa, Spain and the USA).

KEY TAKEAWAYS FOR DECISION-MAKERS

1. Key aspects and enablers of the energy transition – such as electrification, efficiency, digitalisation and decentralisation – all depend on consumer action. There is no realistic pathway to electrifying end-uses that does not mobilise individual consumer investment at scale. Nor is there a plausible worldwide vision of a decentralised clean energy system that does not include solutions such as self-generation and energy communities.
2. There is significant benefit to consumers and to the energy system of increased consumer engagement in the energy transition: the energy system can become more effective, efficient and resilient, and deliver increased value to consumers, and consumers can benefit from lower energy bills, improved home comfort and value, better health, and improved air quality. In some of the countries we have analysed, a consumer-centric energy transition could deliver savings ranging between 40% and 60% thanks to the shift to electricity for heating, cooling, and cooking, local embedded electricity production, and fixed price renewable energy supply versus fossil fuel based energy with variable prices that depend on the oscillation of commodity markets.

3. Consumer protection and empowerment can address many of the barriers that exist for consumers to take action on their energy supply, on the choices they make when purchasing and using appliances and on how much they engage with the energy system.
4. Taking a consumer journey approach to assess the barriers to a faster and fairer energy transition uncovers multiple intervention opportunities at each stage:

Pre-purchase. Improve consumer awareness and understanding of the need and opportunities for change through:

- improving information, labelling and awareness campaigns
- ensuring transparency, relevance and understandability of information
- regulating privacy, reliability and quality of data aspects, to build and maintain consumer confidence in digital solutions.

Pre-purchase. Improve the market availability of suitable, safe and affordable options through:

- establishing direct policy support through direct or indirect incentives, shifting focus from polluting solutions to clean ones (e.g. from gas boilers to heat pumps)
- recognising new forms of consumer practice, such as prosumption, and the development of appropriate regulatory mechanisms to enable and foster these
- creating pricing and financing models capable of dealing with the intrinsic cost structure of energy-efficient solutions (upfront investment followed by steady cost saving over time) and reflecting these features in an adequately low interest rate (cost savings means the consumers will improve their ability to repay the loan because of the solutions it financed, thus improving the consumer's financial risk profile. This could – and should – be reflected in a lower interest rate) or in other forms such as 'pay-as-you-go' models that add repayment of equipment costs to energy bills over an agreed time frame
- developing innovative business models that enable consumers to offer flexibility as a service to the energy system
- using market and network arrangements optimal for the specific context, like energy communities in well-developed urban or industrial areas
- ensuring that product standards and standards of practice keep pace with the rapid rate of change in the market, so that the process of updating these does not delay the offer of new options to consumers.

Purchase. Remove barriers to implementation at the point of investment through:

- removing administrative barriers to uptake, such as complex permitting systems that cause long delays
- ensuring that there are sensible options for financing investments that are available and convenient for all consumers, especially including those on low incomes.

Post-purchase. Ensure efficient, safe and effective use of new products and services through:

- ensuring that consumers have access to an easy way to learn how to use new or unfamiliar technologies
- ensuring that the gap between current consumer digital literacy and the level required to effectively operate new systems is reduced, both by consumer education and by simplification of the user interface with the sophisticated technologies involved.

Post-purchase. Ensure consumers' needs for maintenance, repair and redress are met through:

- ensuring that local supply chains develop
- ensuring access to robust redress systems.

5. In addition to these actions, there is an overarching need for the viewpoint and needs of consumers, and their protection and empowerment, to be embedded in the design, regulation, and operation of the energy system. This will require action and co-operation between energy market actors, system designers, regulators, and policy-makers, and consumer representatives and protection organisations. It is essential that the consumer experience is fully represented and taken into account in the energy transition.

RECOMMENDATIONS

We recommend:

- **Harmonising energy and consumer policy-making and regulation at national and international levels:** we want to see a step-change in collaboration including national policy-making forums that bring together diverse actors, and greater direct employment of consumer specialists in energy organisations.
- **Supporting market offers and business models that protect and empower consumers by design:** such as through the creation of one-stop shops to provide consumers with comprehensive, trusted information and advice.
- **Ensuring greater measurement and tracking of progress on the consumer-side of energy transitions:** with the inclusion of metrics on affordable access to energy solutions, savings passed on to consumers, understanding of clean energy solutions and their benefits and access to clean transport solutions.

This White Paper is an invitation to connect, learn and build together with leaders from all types of stakeholders who want to see change in energy systems with and for consumers. We are inviting partners to join us on a roadmap of actions to put consumers in the lead in the clean energy transition.

1. INTRODUCTION

The supply and use of energy produces around three-quarters of global greenhouse gas emissions today and holds the key to averting the worst effects of climate change.¹ Limiting global warming to less than 2°C or 1.5°C will require global emissions to be reduced by 30% or 45%, respectively by 2030, compared with emission projections under current policies, and is to continue to decline rapidly post-2030.² This will require an urgent and fundamental transformation of energy systems at a global scale,³ with profound implications for people, societies, and economies.⁴

Consumers must be at the heart of this transformation, not least because energy is required to meet basic human needs.⁵ We are all consumers of energy services in our everyday lives. Energy systems enable us to use energy to meet a variety of needs, including heating and cooling, cooking, work and entertainment, travel and more. The ultimate purpose of energy provision is to meet people's needs, and their desire to meet them is the fundamental – and probably the strongest – market driving force. Energy system change based on an understanding of consumers' needs and rights leverages this force. This is increasingly the case as the transition accelerates trends such as electrification, digitalisation, and decentralisation, leading to more intimate and complex interactions between consumers and the wider energy system. Realising the interlinked benefits this transition can bring to both individuals and systems is key to accelerating progress and building trust.

The opportunity offered by a greater focus on consumers is clear: the Intergovernmental Panel on Climate Change (IPCC) in its sixth assessment report notes that up to 70% reduction in emissions is possible from action on consumption alone.⁶ Analysis in individual countries has also noted the potential of demand reduction: for example, the latest academic research in the UK suggests that national energy demand could be more than halved by 2050.⁷

This at the same time will bring direct economic benefits to consumers. In some of the countries we have analysed, a consumer-centric energy transition could deliver savings ranging between 40% and 60% thanks to the shift to electricity for heating, cooling, and cooking,⁸ local embedded electricity production,⁹ and fixed price renewable energy supply versus fossil fuel based energy with variable prices that depend on the oscillation of commodity markets.¹⁰

1 IEA, 'Net zero by 2050: a roadmap for the global energy sector', 2021, https://iea.blob.core.windows.net/assets/deebef5d-0c34-4539-9d0c-10b13d840027/NetZeroBy2050-ARoadmapfortheGlobalEnergySector_CORR.pdf.

2 Enabling sustainable lifestyles in a climate emergency', UNEP, 09/05/22, <https://www.unep.org/resources/policy-and-strategy/enabling-sustainable-lifestyles-climate-emergency>.

3 World Meteorological Organization, '2022 state of climate services: energy', 2022, <https://public.wmo.int/en/our-mandate/climate/state-of-climate-services-report>.

4 The World Energy Council has noted the societal and human impacts of the energy transition, for example in its 2021 World Energy Issues Monitor, titled: 'Humanising Energy', <https://www.worldenergy.org/publications/entry/world-energy-issues-monitor-2021-humanising-energy>.

5 For example, see the United Nations Children's Fund (UNICEF) work on how home and local environments – fundamentally affected by patterns of energy use and supply – shape children's well-being: https://www.unicef-irc.org/publications/pdf/RC17-EN_Places-and-Spaces_Environments-and-childrens-well-being_Report-Card-17.pdf.

6 IPCC Working Group III, 'Climate change 2022: migration of climate change', 2022, <https://www.ipcc.ch/report/sixth-assessment-report-working-group-3/>.

7 Barrett, J., Pye, S., Betts-Davies, S., Eyre, N., Broad, O., Price, J., et al, 'The role of energy demand reduction in achieving net-zero in the UK', 2021, <https://low-energy.creds.ac.uk/the-report/>.

8 Energy: 20 tips to save on your bills, ENEA, 17/03/22, <https://www.enea.it/en/news-enea/news/energy-20-tips-to-save-on-your-electric-bill>.

9 Jaeger, J., Gonçalves, T., Harsono, A., & Bird, L, 'Renewable energy shouldn't be blamed for spiking energy prices – it's the solution', World Resources Institute, 24/01/22, <https://www.wri.org/insights/why-renewable-energy-solution-high-prices>.

10 Larense, J., King, B., Wimberger, E., Pitt, H, Kolus, H., Rivera, A., et al, 'Pathways to Paris: a policy assessment of the 2030 US climate target', 2021, <https://rhg.com/research/us-climate-policy-2030/>.

Alleviation of energy poverty and delivery of universal access to clean energy remain key priorities for energy action in all regions of the world, as established with the seventh United Nations (UN) Sustainable Development Goal (SDG)¹¹ and reflected in the UN Guidelines for Consumer Protection, which has served as a model for national legislation since its adoption in 1985.¹² It is essential that these agendas (climate, access, poverty alleviation) go hand in hand to deliver a clean energy transition for people and the planet.

Despite these clear drivers for placing consumers at the heart of the energy transition, policy to date has primarily been designed from the point of view of the energy system and not that of energy consumers. This paper is a first step in changing this, by considering the barriers consumers face in changing the way they use energy in three key areas: clean energy supply; buildings and appliances; and active engagement with the energy system. This paper assesses how improved consumer protection and empowerment can overcome these barriers.

The current energy price crisis underlines the importance and urgency of change, since the energy transition represents a convincing way to shield customers from future turmoil while fighting climate change. In a recent global survey of consumer advocacy experts,¹³ 90% of respondents reported increasing energy prices for consumers over the course of 2022, with 17% reporting the price more than doubling. According to respondents, price increases are causing consumers to adjust household budgets and/or reduce energy consumption to be able to pay increasing energy costs. Almost 70% of survey respondents said that all or a majority of consumers in their country have been seriously affected by rising energy prices and shortages.

This poses key questions around the costs of energy system change and how costs are distributed, namely: Who benefits?; Who is able to participate and take advantage of the new opportunities?; How can energy transitions ensure greater inclusiveness and allow participation by all groups of consumers versus fossil fuel based systems?; What needs are recognised (or not)?; Who drives these transitions?; and To what extent are consumers represented in discussions and decision-making around energy and energy system change? Linked to these considerations is the fundamental question: What type of energy transition is best equipped to meet these challenges?

Discussions of how to optimise the energy transition rarely start from the consumer's point of view: this paper is intended to fill the gaps in insight that this has created.

In this White Paper, we consider:

- how consumer practices need to change to advance clean energy transitions, and what opportunities and barriers are faced by consumers in making these changes
- how consumer protection and empowerment interventions can help to maximise opportunities and address these barriers, enable consumers to benefit from the opportunities, and ensure just and equitable outcomes for consumers in energy transitions.

11 UN website, [THE 17 GOALS | Sustainable Development \(un.org\)](https://www.un.org/sustainabledevelopment/).

12 UNCTAD website, <https://unctad.org/topic/competition-and-consumer-protection/un-guidelines-for-consumer-protection>.

13 Consumers International, 'Global member insights survey', 2022.

The underlying premises of this work are that:

- enabling and supporting consumers to adopt sustainable energy practices presents a significant opportunity to accelerate just energy transition
- barriers faced by consumers are systematic and various, and must be tackled at all stages of consumer journeys, from initial awareness of new products or services, through purchase and use, to maintenance and repair
- consumer protection is a key enabler that builds trust and confidence when familiar products, systems or services are changing significantly, as is the case in the transition to a net zero energy system
- an energy transition that is geared towards efficient electrification – the progressive use of electricity from renewable sources in services and activities – is best placed to insulate consumers from international price crises, and to create synergies between the demands of system, individual, and sustainability
- through carefully designed consumer empowerment and protection interventions, a rapid transition to clean energy futures can be achieved alongside just, equitable outcomes for consumers.

The UN Guidelines for Consumer Protection set out recommendations in terms of effective consumer protection legislation and enforcement to protect the 11 legitimate consumer needs. These UN Guidelines include high-level principles for the promotion of universal access to clean energy. This White Paper provides a more detailed consideration of the role of consumer protection in achieving sustainable energy futures, and how consumer protection and empowerment together can support consumers and remove barriers to the adoption of sustainable energy practices.

Chapter 2 provides an overview of the theoretical basis of the work and identifies examples of the consumer practices that will need to change to enable the energy transition.

Chapter 3 sets out the barriers faced by consumers in each of our three types of consumer action (clean electricity supply, buildings and appliances, energy system engagement).

Chapter 4 examines the role of consumer protection and empowerment.

Chapter 5 addresses this White Paper's findings and suggests interventions to improve consumer protection and increase consumer empowerment.

Chapter 6 discusses the reasons behind the lack of focus by decision-makers on the consumer-side of the energy transition.

Chapter 7 is the concluding chapter and offers recommendations for urgent actions that could have a significant impact to protect and empower consumers in the energy system.

2. CONSUMERS AND SYSTEM CHANGE

We are all consumers of energy services and as such, we have the potential to take action that accelerates clean energy transitions to protect ourselves and our planet. As previously noted, the IPCC estimates that consumption changes could reduce greenhouse gas emissions by up to 70% by 2050, across sectors.¹⁴ In practice, this means consumers making changes to how they travel, how they cook and how they heat, cool and power their homes. People can trigger transformative changes by adopting low-carbon alternatives – like taking a train rather than a flight or using electric public transport rather than an internal combustion engine (ICE) private vehicle – and improving existing practices, for example by installing heat pumps or solar PV system for family or multi-unit buildings. A consumer-centred energy transition also will offer significant health, well-being and financial benefits to people globally including cleaner air, universal access and lower costs for energy services. The evidence base for these benefits is extensive. Examples include: Enel Foundation’s work on the benefits of reaching net zero¹⁵; the International Energy Agency (IEA) work on multiple benefits of energy efficiency¹⁶ and on the energy transition for jobs creation in cooperation with Enel Foundation¹⁷; work at Harvard on the health benefits of EVs¹⁸; and data from the Energy Sector Management Assistance Program (ESMAP) on the benefits of clean cooking.¹⁹ But consumers may face diverse barriers to action, such as: unfamiliarity with new technologies and their benefits; lack of access to affordable finance; lack of adequate incentives (both direct and indirect) making cleaner technologies more accessible; lack of access to affordable finance or incentives making cleaner technologies more accessible. Removing these barriers and empowering consumers to adopt new practices is of paramount importance for accelerating the clean energy transition while improving consumers’ well-being and finances.

2.1 INTENTION-ACTION GAP

Encouragingly, stated consumer attitudes about the need to act on climate change have shifted significantly in recent decades. A recent United Nations Development Programme (UNDP) survey of 1.2 million people in 50 countries found that 64% of people said that climate change is an emergency.²⁰ These attitude shifts have not been universal however, with some differences observed between different age groups and genders – younger consumers and women are more likely to want to make greener choices.²¹

A key hurdle is the difference between many consumers’ stated desire to act and their actual choices and practices, sometimes referred to as the ‘green gap’ or ‘intention-action gap’.

Likely causes of the intention-action gap can be grouped into:

- those internal to the consumer (e.g. consumer attitudes and behavioural biases)
- those external (e.g. affordability, lack of market access).

14 IPCC Working Group III, ‘Climate change 2022: migration of climate change’, 2022, <https://www.ipcc.ch/report/sixth-assessment-report-working-group-3/>.

15 ENEL website, <https://www.enelfoundation.org/topics/articles/2022/09/net-zero-e-economy-2050>

16 IEA, ‘Multiple benefits of energy efficiency’, 2019, <https://www.iea.org/reports/multiple-benefits-of-energy-efficiency>.

17 IEA, ‘World energy employment’, 2022, <https://www.iea.org/reports/world-energy-employment>.

18 Harvard T.H. Chan website, <https://www.hsph.harvard.edu/news/hsph-in-the-news/increasing-the-use-of-electric-cars-could-improve-health-outcomes/>.

19 IEA., IRENA., UNSD., World Bank., & WHO, ‘Tracking SDG 7: the energy progress report’, 2022, https://trackingsdg7.esmap.org/data/files/download-documents/sdg7-report2022-full_report.pdf.

20 UNDP, ‘The peoples’ climate vote’, 2021, <https://www.undp.org/publications/peoples-climate-vote>.

21 OECD, ‘Gender and the environment: building evidence and policies to achieve the SDGs’, 2021, <https://doi.org/10.1787/3d32ca39-en>.

Individual attitudes and behavioural biases have a clear influence over consumer choices. These are in part shaped by the external context within which people live, and the way they are expressed as actions is heavily influenced by this context. Approaches must consider how established technologies, systems, institutions and political landscapes may support or hinder consumers in meeting their needs affordably and sustainably. Consumer participation in energy transitions must be understood in relation to the social, technical and political structures within which consumers act, and the wider systemic factors needed to drive equitable, affordable access to energy.

An approach that focuses solely on the choices made by individual consumers fails sufficiently to account for the effects of physical and economic 'lock-in'.²² Social and infrastructural factors produce certain patterns and norms of demand, which are not easily broken by well-intentioned individuals.²³ An example of this effect is the way that the infrastructure of our buildings and cities affects the choices we have, to maintain thermal comfort: in a noisy and polluted urban environment, natural night-time ventilation and cooling is not an option even for those people who would ideally like to use it.²⁴

This suggests that the importance of public policy in influencing consumer practice change has previously been understated. Only by tackling the systemic conditions and drivers of habitual practices, can we reconfigure systems in a more sustainable way: indeed, around three-quarters of the behavioural changes modelled in the IEA 2050 net zero emissions roadmap, can be directly influenced or mandated by government policies.²⁵

2.2 IDENTIFYING PRIORITY CONSUMER PRACTICE CHANGES

To explore the potential for consumer practices for clean, efficient energy use, this White Paper focuses on three types of energy services: home heating and cooling; cooking; and transport.

The energy required to deliver these three services will in part be determined by consumer practices. In addition to those practices directly linked to heating and cooling, cooking and transport, the extent to which consumers engage directly with the energy system as a whole, through prosumption²⁶ and demand flexibility,²⁷ is also of interest here. To analyse opportunities and barriers facing consumers across the three types of energy services, we look at three groups of choices or practices (see Figure 1) that consumers can adopt: those related to clean energy supply; to interaction with buildings and appliances; and to energy system engagement.

22 Sovacool, B.K., & Griffiths, S, 'Renewable and Sustainable Energy Reviews', The cultural barriers to a low-carbon future: a review of six mobility and energy transitions across 28 countries, 119 (109569), 05/03/20, <https://doi.org/10.1016/j.rser.2019.109569>; Stephenson, J., Barton, B., Carrington, G., Gnoth, D., Lawson, R., & Thorsnes, P, 'Energy Policy', Energy cultures: a framework for understanding energy behaviours, 38 (10), 01/10/10, <https://doi.org/10.1016/j.enpol.2010.05.069>; Shove, E, 'Journal of Consumer Policy', Converging conventions of comfort, cleanliness and convenience, 26 (4), 01/12/2003, <https://doi.org/10.1023/A:1026362829781>.

23 Shove, E, 'Journal of Consumer Policy', Converging conventions of comfort, cleanliness and convenience, 26 (4), 01/12/2003, <https://doi.org/10.1023/A:1026362829781>.

24 See, for example, pp. 9–15 in Chavaud de Rochefort, H., & Wade, J, 'Energy sufficiency in urban planning and transport: a discussion', 2019, www.energysufficiency.org/static/media/uploads/site-8/library/eventreports/london_workshop_summary.pdf.

25 IEA, 'Net zero by 2050: a roadmap for the global energy sector', 2021, <https://www.iea.org/reports/net-zero-by-2050>.

26 Prosumption is the term used to describe the situation where an energy consumer is also an energy producer (e.g. using solar PV assets that they own) and supplies any energy they do not use to the grid.

27 Demand flexibility is the ability and willingness of an energy consumer to shift the timing of their energy demand to better match the timing of availability of the energy supply.



Figure 1.
Consumer choice
within the energy system.

Using the three groups of choices allow us to link the more abstract and theoretical ideas of consumer journeys and principles of consumer protection to real-world decisions and actions in a range of socio-cultural contexts.

This offers a framework to inform decision-makers. However, we should remember that this is not how consumers will see their interactions with the energy system. For them, it is about how they make their homes comfortable, how they cook their food and how they get around every day. It is about changing energy supply tariffs, purchasing and using new things and taking their smart meter display out of the cupboard and beginning to understand how they can use it to its full extent.

CLEAN ENERGY SUPPLY

While 91% of the global population have access to electricity,²⁸ renewable generation only accounts for 29% of total electricity generation, globally.²⁹ However, this situation is changing rapidly. According to the IEA: “The first truly global energy crisis, triggered by Russia’s invasion of Ukraine, has sparked unprecedented momentum for renewables”.³⁰ The disruption to fossil fuel supply has shown the crucial role of domestically sourced, price competitive renewables in contributing to energy security and affordability, and encouraged renewed policy support for them. Empowering consumers to adopt clean electricity supplies is inextricably linked to the delivery of renewables-based energy systems, and is also essential to ensure access to sufficient, clean energy for the 733 million people currently lacking basic access to electricity.

The optimal strategy is to achieve this through supply of clean electricity and shifting consumers’ energy practices (particularly heating, cooking, and transport) to electricity, which in turn depends on the use of electric appliances and technologies (discussed separately below).

For the consumer, potential for clean energy supply depends on national and local market factors and infrastructure, and may include:

- **Grid-supplied electricity:** for consumers connected to the electricity grid (and not meeting all their own needs from self-produced renewable energy), the sustainability of their electricity supply depends on the carbon intensity of grid-supplied electricity in their area, with the possibility in many markets for consumers to choose a 100% renewable energy supply. An increasing market demand for this kind of energy supply is also stimulating additional investment in renewable power generation.
- **Collective/community solutions:** collective and community energy models are increasingly recognised as an opportunity for consumers to take collective, local action on clean energy supply, especially in areas where self-production is not a feasible option for all the consumers; in off-grid, remote areas, microgrids can be an effective approach to delivering clean electricity.
- **Household self-generation:** both grid-supplied and off-grid consumers can also benefit from generating their own clean electricity, for example through the installation of solar photovoltaic (PV) panels.

28 There are a number of definitions of electricity access. The IEA defines it as a household having access to enough electricity to power a basic bundle of energy services, including several lightbulbs, phone charging, a radio and perhaps also a fan or television. IEA, ‘Defining energy access: 2020 methodology’, 2020, <https://www.iea.org/articles/defining-energy-access-2020-methodology>.

29 IEA website, <https://www.iea.org/reports/global-energy-review-2021/renewables>.

30 IEA website, <https://www.iea.org/reports/renewables-2022/executive-summary>.

BUILDINGS AND APPLIANCES

Efficient use reduces the energy required to achieve the same service outcomes, reducing costs for consumers and energy system costs,³¹ and reducing environmental impact of energy consuming activities. Thus, energy efficiency is key to achieving clean energy futures at the lowest cost, and maximising energy services in off-grid contexts.

A key aspect of efficient use of clean energy is the consumer's interaction with appliances and physical infrastructure (particularly the building). This section focuses on those material assets directly linked to meeting the three types of energy services: heating and cooling; cooking; and transport.

HEATING AND COOLING

Heat is currently the largest energy end-use, making up approximately half of the global final energy consumption and 40% of global carbon emissions. Almost half of total heat use (46%) is for space and water heating in buildings.³² The latest IEA analysis shows that despite growing demand,³³ carbon emissions from energy use for heating were only 1.5% higher in 2021 than in 2010, thanks to the implementation of energy efficiency building and renovation codes as well as the replacement of inefficient fossil fuel boilers with greater use of heat pumps and renewable heating equipment.³⁴

While heat remains the largest energy end-use, the need for space cooling is rapidly increasing because of changes to the climate; in Europe, the demand for space cooling in buildings is expected to increase by 72% by 2030, with space heating demand estimated to fall by 30%.³⁵

Electrification of both ambient heating and cooling through the adoption of district heating and cooling and heat pumps will be required to deliver heating and cooling sustainably and efficiently.

The soaring worldwide sales of heat pumps will hit even higher records as the global energy and climate crisis accelerates their adoption. Further reduction of the upfront cost and training of installers on the supply side are key elements to help consumers and should be among policy-makers' priorities.³⁶

31 According to IEA: "Currently, around 1% of the EU's building stock is renovated each year and with a strong policy push this could rise to 1.7% in 2023. Along with enhanced efforts to replace existing inefficient appliances and lighting, we estimate that these additional actions could save more than 2.5 bcm [of gas] in 2023". IEA, *How to avoid gas shortages in the European Union in 2023*, 2022, p. 15, <https://www.iea.org/reports/how-to-avoid-gas-shortages-in-the-european-union-in-2023>.

32 IEA website, <https://www.iea.org/reports/renewables-2019/heat>.

33 In 2021, direct emissions from heating buildings grew reaching 2,500Mt CO₂, 80% of direct CO₂ emissions in the buildings sector.

34 IEA website, <https://www.iea.org/fuels-and-technologies/heating>.

35 IRENA website, <https://www.irena.org/Energy-Transition/Technology/Cities-and-buildings#heating-and-cooling>.

36 'The global energy crisis is driving a surge in heat pumps, bringing energy security and climate benefits', IEA, 30/11/22, <https://www.iea.org/news/the-global-energy-crisis-is-driving-a-surge-in-heat-pumps-bringing-energy-security-and-climate-benefits>.

COOKING

Electricity accounts for just 7.5% of energy used for cooking, globally, ranging from 1.2% in the Eastern Mediterranean Region to 11.6% in Europe and 17.5% in the Western Pacific Region.³⁷ Key to increasing electrification of cooking is the adoption by consumers of electric appliances. This can provide benefits in terms of energy efficiency – the per unit efficiency of induction stoves is about three times more efficient than gas units – and in terms of improved indoor air quality and a safer consumer experience. In many developing countries, provision of access to ‘cleaner’ fuels for cooking remains a priority, including gaseous fuels (liquefied petroleum gas [LPG], natural gas) as well as electricity, as alternatives to traditional sources of energy such as solid biomass (wood, animal dung, crop waste) and coal, which generates harmful household air pollution³⁸ together with carbon dioxide (CO₂) emissions.

However, the use of LPG and natural gas for cooking is not aligned with net zero goals, and may – and increasingly so, as gas prices increase and the cost of renewables falls – be more expensive than clean, electric alternatives, including electric pressure cookers (EPCs), slow cookers, and induction stoves. Interestingly, the benefits, quantified in monetary terms, of switching to a modern, clean cooking system outweigh the costs of its implementation, while the latter are far lower than those of inaction. These benefits relate primarily to health, climate, and gender equality.³⁹

TRANSPORT

Heavily reliant on fossil fuels and accounting for almost 30% of global energy consumption and 37% of global emissions,⁴⁰ transport is another sector presenting critical potential for practice changes to advance clean energy transitions.

IEA estimates that achieving net zero by 2050 will require a 20% reduction in transport emissions by 2030, which will depend on the rapid electrification of road transport.⁴¹

ENERGY SYSTEM ENGAGEMENT

There is increasing recognition that clean energy futures involves new forms of interaction between energy systems and end users, including a shift towards consumers becoming prosumers (i.e. consuming and also producing electricity and exporting self-generated electricity back to the grid) and ‘smart’ energy solutions increasing the responsiveness of the demand side to help balance supply and demand on electricity grids.

37 WHO, ‘Database: cooking fuels and technologies (by specific fuel category)’ 2021, www.who.int/publications/m/item/database-primary-reliance-on-fuels-and-technologies-for-cooking.

38 ‘Household air pollution’, WHO, 28/11/22, <https://www.who.int/news-room/fact-sheets/detail/household-air-pollution-and-health>.

39 The World Bank’s ESMAP developed a Clean Cooking Planning Tool to estimate, using scenarios, the sectoral costs and public co-benefits of transitioning urban and rural populations to modern and improved cooking energy services by 2030, thereby visualising potential transition pathways to universal access to clean cooking solutions (SDG Target 7.1). ‘The Clean Cooking Planning Tool: a new resource to explore the costs and benefits of transitioning to clean cooking’, ESMAP, 12/05/22, <https://esmap.org/esmap-The-Clean-Cooking-Planning-Tool>.

40 IEA website, <https://www.iea.org/topics/transport>.

41 IEA website, <https://www.iea.org/topics/transport>.

PROSUMPTION

Prosumption can be particularly useful in regions with limited centralised electricity supply or issues with load shedding. In modern systems, electricity grids that are increasingly efficient and flexible enable citizens and businesses to jointly build facilities to produce, share, and consume renewable energy, resulting in a vital economic development lever for transition and an effective way to fight climate change. Generally based on consumer ownership of PV assets, energy communities integrated with distribution networks can ensure reliability, resilience, and cost-effectiveness. Because of consumer ownership of PV assets, the considerations for investment in self-generation apply here also.

Prosumption also involves consumers' assets interacting with the electricity distribution grid and so the presence of regulatory and legal frameworks to enable this is of paramount importance, as is the level of payment to consumers who export electricity to the grid.

FLEXIBILITY (AND HOME ENERGY MANAGEMENT SYSTEMS [HEMS])

Increased consumer ability and willingness to modify the timing or the amount of the energy demanded is becoming increasingly critical, as grid management needs to respond to an increasing proportion of intermittent supply. Consumers can provide flexibility through increasing/reducing or shifting the timing of in-home energy use.⁴²

Technology can enable more sophisticated schemes. For example, HEMS implementation based on electronic meters enable a better use of electricity and savings on daily consumption. Already today most innovative meters allow customers to receive near real-time information on their electricity consumption via a dedicated communication channel to the customer.⁴³

Increasingly, the use of 'vehicle-to-grid' technologies will also allow consumers to use their EV batteries flexibly, both by changing the timing of charging and by offering the battery as a source of energy at times when there is excess demand on the system. This is already possible for behind the meter energy storage systems such as batteries that, in some countries (e.g. France, USA, Germany) are allowed to participate in the energy markets and provide flexibility services to the grid.

2.3 UNDERSTANDING THE CONSUMER JOURNEY

Looking at the necessary changes from the point of view of the consumer helps us to understand the barriers that consumers face when making the three groups of choices (Figure 1). These three groups of choices can be thought of as an interlinked journey – a series of interactions a consumer has with a product or service. We look at how consumer needs are relevant at each stage of the journey and the extent to which these needs are met (see Figure 2). We consider the potential for improved consumer protection and empowerment to better meet these needs and hence unlock some of the barriers to action.

⁴² Consumers participating in demand response programmes (flexible capacity providers), agree to modify their energy demand patterns by: 1. reducing overall energy use (load curtailment) in response to high prices or system conditions; 2. shifting loads from peak to off-peak periods (load shifting); and 3. increasing demand when supply is abundant ('demand up').

⁴³ In Italy, for example, this standardised communication is called 'Chain 2', e-distribuzione website, <https://www.e-distribuzione.it/open-meter/chain-2.html>.

The consumer journey framework adopted here includes five stages:

- **Pre-purchase: awareness and understanding:** Do consumers understand and trust the reasons, the opportunities and benefits for change and how to make it happen?
- **Pre-purchase: availability of suitable, safe and affordable options:** Are there safe and affordable options available in the market for consumers to choose?
- **Purchase: implementation:** Can consumers invest in and implement solutions with ease and without undergoing serious risks?
- **Post-purchase: efficient, safe and effective use:** Are consumers able to use new systems or technologies efficiently, safely and effectively?
- **Post-purchase: maintenance, repair and redress:** Are consumers protected and supported after purchase and able to access adequate maintenance, repair and redress





Figure 2. Building confidence and trust in the consumer journey

With respect to their ability to adopt sustainable energy practices, consumers may miss opportunities or face barriers relating to these stages of the consumer journey, depending on national and local circumstances and across different groups of consumers. In this paper, we look at the potential for consumer protection and empowerment to address these.

Energy is recognised as an area of particular importance in the UN Guidelines for Consumer Protection (see Box 1).

Box 1. Energy in the UN Guidelines for Consumer Protection

- Article 44(i): **consumer education and information programmes** should cover important aspects of consumer protection, including efficient use of materials, energy and water
- Article 52: members states should encourage the design, development and use of **products and services that are safe and energy- and resource-efficient**, considering their full life cycle impacts
- Article 69: energy services should be seen as an **area 'of essential concern'** for the health of consumers, and one, therefore, that should be prioritised, pointing to policies around quality control, adequate, secure distribution facilities, product labelling and information education and research programmes
- Article 76: member states should **promote universal access to clean energy**, and have in place strong national policies to improve supply, distribution and quality of affordable energy to consumers. It emphasises the need to consider levels of service, quality and technology, regulatory oversight, need for awareness raising and importance of community participation
- Article 77: member states should **formulate, maintain and strengthen statutes on public utilities to ensure equitable access and improve service provision**, and should consider the way consumers interact with services from beginning to end, and the needs of vulnerable and disadvantaged consumers

Source: UNCTAD website,
<https://unctad.org/topic/competition-and-consumer-protection/un-guidelines-for-consumer-protection>.

This is a strong starting point, establishing energy as an essential need for consumers, and laying the foundation for engagement across consumer and energy arenas. However, these remain high-level principles aimed at UN member states, with a need for more in-depth treatment of the needs and opportunities for consumer protection and empowerment interventions, to inform those actors able to drive the implementation of these guiding principles.

This paper builds on this framework, seeking to present specific, practical examples of how the UN Guidelines can be met in the energy transition.

3. OPPORTUNITIES FOR AND BARRIERS TO CONSUMER ACTION

This chapter sets out typical barriers faced by consumers in adopting sustainable energy practices across each of the three types of consumer action: clean electricity supply; buildings and appliances; and energy system engagement. This is a non-exhaustive and generalised overview. To understand how these three types of consumer action manifest, in a given country or region, and the particular combinations of challenges faced in a certain context, further context-specific analysis is required. Insights from exploratory country analyses are therefore included as case studies, to illustrate examples of barriers and solutions in particular contexts (see Boxes 2 to 16).⁴⁵


The overview of barriers presented here reflect key concerns and challenges identified through a combination of desk-based evidence review, stakeholder interviews, and an international roundtable with experts and key stakeholders.



⁴⁵ The fully referenced and contextualised country case studies are available separately.


3.1 CLEAN ELECTRICITY SUPPLY

Table 1. Barriers to consumer action on clean electricity supply

	Barriers associated with grid-supplied clean electricity	Barriers to collective/ community models for clean electricity supply	Barriers to self-generation of clean electricity
Awareness and understanding	<p>Lack of consumer awareness of:</p> <ul style="list-style-type: none"> • the importance of clean energy to both mitigate climate change and abate local pollution • the importance and role of changing energy practices to sustainable ones • available solutions/technologies/offers for sustainable energy practices • economic and environmental benefits (and relative cost/benefits) of available solutions/ technologies <p>Lack of consumers’ clear understanding of the market mechanisms in place (e.g. valorisation of the electricity injected into the grid; communication of Guarantees of Origin for renewable energy too technical and hence consumers’ confusion on the purpose and value)</p> <p>Greenwashing – exaggerated or misguided claims from some suppliers leading to consumer confusion and a lack of trust <i>[See: Box 10, South Africa case study]</i></p>		
Availability of suitable, safe and affordable options	<ul style="list-style-type: none"> • Prices tied to fossil fuels and exposure to volatility • Taxes and levies, which usually rests more heavily on electricity than on other, more polluting, energy carriers, such as natural gas • Lack of (legitimate) 100% clean electricity offers • Limited (smart) meter coverage • Market structure (e.g. monopoly limiting innovative offerings; lack of regulation meaning safety not assured) 	<ul style="list-style-type: none"> • Lack of legislative frameworks Unclear definitions Need for upfront consumer investment <i>[See: Boxes 10 and 8, South Africa and Spain case studies]</i> 	<ul style="list-style-type: none"> • Need for upfront consumer investment <i>[See: Box 6, Chile case study]</i>
Investment/ uptake		<ul style="list-style-type: none"> • Added complexity due to multi-party involvement • Barriers associated with definitions/criteria for community projects • Administrative burdens/ bureaucratic processes • Permitting and inspection 	<ul style="list-style-type: none"> • Permitting and inspection • Absence of adequate incentive mechanisms (e.g. subsidies, tax credits, etc.) or barriers to their uptake • Lack of dedicated financing schemes that recognise the financial risk mitigation enabled by the energy efficiency-driven cost saving • Trust in the quality of provision and installation Lack of qualified installers to provide a quick and efficient intervention <i>[See: Boxes 6 and 14, Chile and USA (Solar Access Act) case studies]</i>
Efficient use and operation		<p>Lack of understanding of how to match demand to system output and hence maximise benefits for consumers</p> <p><i>[See: Box 6, Chile case study]</i></p>	
Maintenance, repair and redress		<p>Lack of local supply chains for reliable ongoing maintenance and repair</p>	


3.2 BUILDINGS AND APPLIANCES

Table 2. Barriers to consumer action on buildings and appliances

	Heating and cooling		Cooking	Transport
	Appliances	Building energy Performance		
Awareness and understanding	Lack of consumer awareness of: <ul style="list-style-type: none"> • the importance of energy efficiency • possible efficiency gains and benefits (and relative cost/benefits) of improved energy efficiency (both cost wise and environmental impact) • available high-efficiency solutions/technologies/offers • too much information available on the topic, often contradictory, without a single official channel specifically aimed at providing answers to consumers' doubts and questions on the matter (this can also generate unfounded fears in final users, among other things) <i>[See: Box 11, Rwanda (R-COOL); Box 2, Rwanda (Electrocook); Box 13, USA (ACCII) case studies]</i>			
Availability of suitable, safe and affordable options	Need for upfront consumer investment New business models; unregulated actors (e.g. heat networks/new financing models, such as the Property Assessed Clean Energy (PACE) approach used in the US) <i>[See: Box 11, Rwanda (R-COOL); Box 2, Rwanda (Electrocook); Box 13, USA (ACCII); Box 15, Romania (SMARTER project) case studies]</i>			
Investment/uptake	<ul style="list-style-type: none"> • Absence of adequate incentive mechanisms (e.g. subsidies, tax credits, etc.) or barriers to their uptake • Complex/disruptive installation processes • Lack of trust in quality of provision and installation • Lack of qualified installers to provide a quick and efficient intervention Interdependency with Building Energy Performance <i>[See: Box 11, Rwanda (R-COOL) case study]</i>	<ul style="list-style-type: none"> • Barriers to subsidy uptake, including complex administrative/ bureaucratic processes • Complex/disruptive installation processes • Lack of trust in quality of provision and installation • Barriers related to tenancy or ownership rights • Building regulations • Complexity of solutions, need for integrated solutions and insufficient advice on how to best approach retrofit • Lack of dedicated financing schemes that recognise the financial risk mitigation enabled by the energy efficiency-driven cost saving <i>[See: Box 15, Romania (SMARTER project) case study]</i>	<ul style="list-style-type: none"> • Absence of adequate incentive mechanisms (e.g. subsidies, tax credits, etc.) or barriers to their uptake • Lack of trust in quality of provision and installation 	<ul style="list-style-type: none"> • Absence of adequate incentive mechanisms (e.g. subsidies, tax credits, etc.) or barriers to their uptake
Efficient use and operation	<ul style="list-style-type: none"> • Lack of understanding of how to use clean, efficient heating technologies effectively • Changing heating/ cooling practices 		<ul style="list-style-type: none"> • Lack of understanding of how to use clean cooking technologies effectively • Changing cooking practices 	Changing transport practices (electric vehicle charging) <i>[See: Box, 13, USA (ACCII) case study]</i>

3.3 ENERGY SYSTEM ENGAGEMENT

Table 3. Barriers to consumer action on energy system engagement

	Prosumption	Smart energy solutions and energy flexibility
Awareness and understanding	<p><i>[See: Box 5, Romania (prosumption) case study]</i></p>	<ul style="list-style-type: none"> • Low levels of awareness and understanding • Highly complex area <i>[See: Box 12, UK (HOMEflex); Box 9, USA (OhmConnect) case studies]</i>
Availability of suitable, safe and affordable options	<ul style="list-style-type: none"> • Need for upfront consumer investments • Lack of recognition in regulation • Lack of or insufficient price for export to the grid <i>[See: Box 5, Romania (prosumption) case study]</i> 	<ul style="list-style-type: none"> • Incompatible market design with a regulatory framework that does not enable the participation of consumers • Lack of (attractive) market offers • Insufficient incentives • New business models; unregulated actors (e.g. aggregators) • Data reliability and quality, security and privacy <i>[See: Box 12, UK (HOMEflex); Box 9, USA (OhmConnect) case studies]</i>
Investment/uptake	<ul style="list-style-type: none"> • Lack of access to appropriate metering (e.g. smart meter for half-hourly metering) • Permitting complexity/red tape • Absence of adequate incentive mechanisms (e.g. subsidies, tax credits, etc.) or barriers to their uptake • Lack of dedicated financing schemes that recognise the financial risk mitigation enabled by the energy efficiency-driven energy bill saving 	<ul style="list-style-type: none"> • Lack of access to a smart meter • Inability to change use patterns, for example in the case of vulnerable consumers who might need a constant energy supply • Lack of price signals that might encourage consumers' investments and participation • Lack of suitable devices on the market <i>[See: USA (Solar Access Act) case study]</i>
Efficient use and operation	<ul style="list-style-type: none"> • Quality of provision and installation 	<ul style="list-style-type: none"> • Lack of local supply chains for reliable ongoing maintenance and repair

4. THE ROLE OF CONSUMER PROTECTION AND EMPOWERMENT

Aware and active consumers taking responsible actions can significantly contribute to the energy transition. There is a clear role for consumer protection and empowerment in helping consumers have the confidence to take actions, and in ensuring that the transition happens in a way that delivers better affordability, increased equity, and improved energy services for consumers. Through increasing energy efficiency, electrification, digitalisation and decentralisation of energy systems, the clean energy transition will mean more intimate and more complex interactions between people and energy systems, creating a potential for consumers to meet their energy needs affordably and sustainably, in turn helping to support and accelerate the transition.

But as set out in Chapter 3, there are barriers faced by consumers, which will need to be addressed at a systemic level. In this chapter, we explore some of the ways in which consumer protection and empowerment interventions can be leveraged to address these barriers.

4.1 AWARENESS AND UNDERSTANDING OF THE NEED AND OPPORTUNITIES FOR CHANGE

There is a strong consensus among consumer authorities and advocates, that consumer awareness of the need and opportunities to shift to more sustainable energy practices remains low. Moreover, to encourage uptake of new practices and technologies, better awareness of both the economic and environmental costs and benefits of clean energy solutions, relative to higher carbon or less efficient solutions, is necessary. IEA modelling suggests that information and awareness measures could enable around 30% of the behavioural change linked to emissions reduction in their roadmap to net zero by 2050.⁴⁶

INFORMATION, LABELLING AND AWARENESS CAMPAIGNS

Product labelling schemes can build consumer awareness of the environmental impacts of products, helping to inform decision-making.

Broader information provision and awareness campaigns have been common tools used by various actors, including governments and consumer advocacy organisations, to increase awareness and understanding among consumers. While data on their effectiveness is limited, insights from key stakeholders suggests that awareness campaigns may be effective in the long-term in shaping social norms and practices. Embedding such interventions within broader programme and service design can help to effectively address multiple barriers simultaneously in a joined-up way (see Box 2, Rwanda case study).

⁴⁶ IEA, 'Net zero by 2050: a roadmap for the global energy sector', 2021, <https://www.iea.org/reports/net-zero-by-2050>.

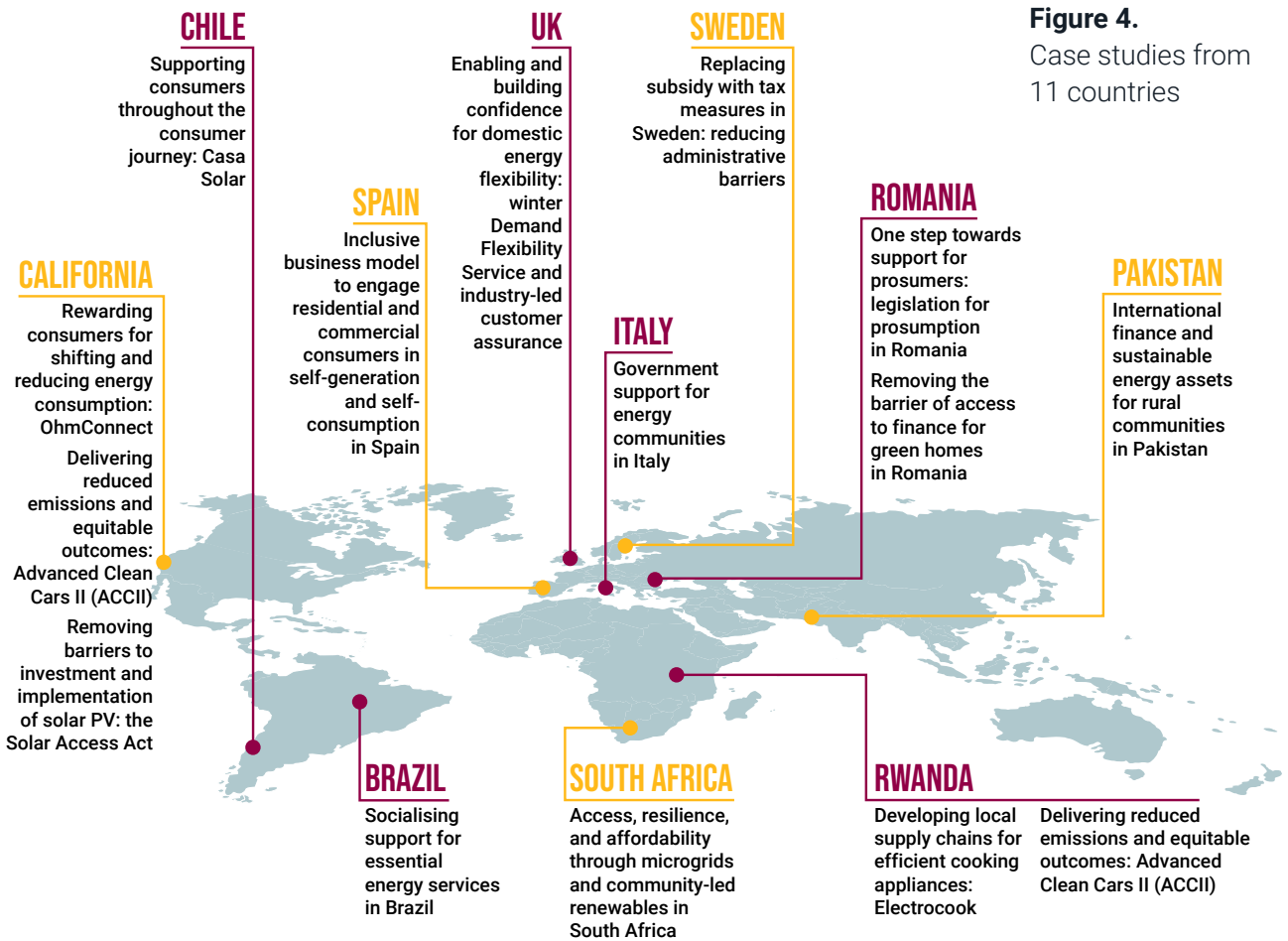


Figure 4.
Case studies from
11 countries

Box 2. Developing local supply chains for efficient cooking appliances: Electrocook (Rwanda)



Electrocook was established in 2020 by ‘Empowering Villages’ with finance from the Energy and Environment Partnership Trust Fund (EEP Africa). It initially aims to locally manufacture and sell 5,000 EPCs to households in Rwanda. The manufacturing workshop will be a women’s co-operative and create jobs for 200 women.

The choice of cooking appliance is based on the need for high efficiency and an understanding of local cooking practices. Consumer information is available on EEP Africa’s website, including the benefits of switching from biomass or charcoal to an EPC and also a cookbook explaining how to prepare traditional recipes using the EPC (a printed copy is also provided with each appliance).

Electrocook are partnering with ARC Power to run a pilot with 50 households that use one of ARC Power’s mini-grids. This will test an innovative pay-as-you-go finance mechanism that incorporates the cost of the appliance into the electricity tariff over a set period.

The project aims to develop a local supply chain for an efficient cooking appliance. It is combining this with experiments to develop accessible finance methods that will enable low-income households to invest in the appliance. In this way, it could overcome both trust and affordability barriers to purchase efficient cooking appliances.

It remains to be seen whether the involvement of women from the local community in the supply chain for the EPCs is sufficient to raise local awareness of the benefits of the appliances, and whether this can then be scaled more widely across Rwanda. It may be that more concerted government or other central bodies is needed to raise awareness sufficiently to achieve the transition to clean cooking in the expected time frame.

TRANSPARENCY

As consumers' interaction with the energy system becomes more complex, transparency will be important to empower people to make informed decisions and engage in new energy practices. The impact of a lack of transparency has been seen in several country studies; including, for example, where retail electricity tariffs are at high risk of (being perceived as) 'greenwashing'. The use of independent, officially recognised sources of information on consumer elements of the energy transition may be required to ensure the needed transparency.

Transparency must not be intended solely as sheer availability of the information, as information needs to be explained as clearly as possible so to be easily grasped by the widest possible audience, overriding the intricacies and technical jargon typical of regulations. This is for example illustrated in relation to the system for Guarantees of Origin, used in the European Union (EU) and the UK to track share of renewable energy in the fuel mix of energy provided to consumers. This system is widely considered a success within the sector, as a mechanism to encourage the generation and consumption of clean electricity, but has been subject to critique among consumers and consumer representatives. This highlights the need not only for transparency, but for meaningful communication between energy sector representatives and consumers and their representatives.

DIGITAL PROTECTION

The transition to a decarbonised energy system is leading to a stronger reliance on digitalisation, with both positive and negative consequences. With respect to consumer empowerment and protection, this trend is reinforcing the importance of digital literacy (to the extent needed to underpin trust in new systems and technologies) in reducing the barriers for the participation in certain consumer practices, such as demand-side response services, and risks creating new drivers of disempowerment. On the other hand, the user interface with sophisticated systems must be simplified so to make the intricacies and technicalities of the technology totally invisible to the user, while guaranteeing full transparency of all essential information. Consumers tend to adopt more quickly easy to use technologies. The easier to use technology tends to be invisible to the user and at the same time totally trustworthy. Alongside increasing levels of consumer understanding, the standards and regulations to ensure data quality, reliability, and protection are crucial to ensuring consumer confidence in digital systems.

4.2 MARKET AVAILABILITY OF SUITABLE, SAFE AND AFFORDABLE OPTIONS

Fundamentally, availability in the market of products and services aligned with the clean energy transition is a prerequisite for consumer adoption, and for these to be relevant to consumers, they must be suitable to consumers' needs and be safe, efficient, affordable, and trusted. IEA modelling suggests that market-based policy instruments could enable around two-thirds of emissions saved by the behavioural changes included in their roadmap to net zero by 2050.⁴⁷

Affordability of available options remains a key barrier to the uptake of all three types of consumer practice, especially for low-income consumers. Even if efficient electric options are perfectly convenient from an economic point of view (i.e. with a positive net present value), they can be financially challenging for many consumers, as they require an upfront investment not always within their reach

⁴⁷ IEA, 'Net zero by 2050: a roadmap for the global energy sector', 2021, <https://www.iea.org/reports/net-zero-by-2050>.

and the savings on energy bills are only realised over a number of years. Forms of interventions to address this include: direct policy support; innovative financing solutions capable of factoring in a more convenient interest rate the intrinsic benefit of energy efficiency and electrification (i.e. lower operating expenditures); development of new business models; and market structures with affordability as a key objective. Additionally, product standards and standards of practice play a role in facilitating trust, particularly around new and emerging technologies and services for the clean energy transition.

DIRECT POLICY SUPPORT

Common interventions to address issues of affordability include direct policy support through subsidies or tax measures. This is used to promote uptake of a variety of technologies, including solar PV, clean heating technologies (heat pumps in particular), building energy efficiency retrofit, clean cooking technologies (particularly in areas with low levels of energy access), energy storages and EVs.

While many countries provide subsidies for solar PV (see for example Box 6, Chile case study) and many other technologies, subsidy programmes may be associated with barriers for consumers to access these, including administrative burden and long wait times (see Box 3, Sweden case study).

In the European context, policy support and government financing are also being leveraged to support energy communities, enabling collective solutions on affordability and access to clean electricity supply (see Box 4, Italy case study).

Policy support will help in terms of recognition of new forms of consumer practices, such as prosumption (see Box 5, Romania case study).

Another important element is the removal of all those schemes designed to incentivise technologies based on polluting energy resources (such as all fossil fuels), to avoid limiting efforts towards the goal of a clean energy transition.

Box 3. Replacing subsidy with tax measures in Sweden: reducing administrative barriers



In Sweden, a previous solar PV subsidy programme had an average wait time of 722 days, when demand peaked in 2016, due to demand for the subsidy exceeding the allocated budget.

Addressing this issue, a tax reduction programme was introduced in 2021, replacing three previous subsidies for solar PV, storage of self-produced electricity and EV charge point installations. It provides percentage tax reductions for the hardware and installation costs of solar PV, storage and EV charging. This system is managed and administered by system suppliers and the Swedish Tax Agency (Skatteverket) and removes the burden for the consumer to apply for the economic support and handling the process by directly reducing the price on the invoice. It is up to the system suppliers to report the deducted amounts to the tax authorities.

Compared to the direct capital subsidy programmes, the tax reduction programme has no limiting budget and thus no queue, enabling everyone who meets the requirements to take advantage of the tax deduction. This will hopefully increase participation, but the data to show this are not yet available.

Box 4. Government support for energy communities in Italy



As part of the Italian National Plan for Recovery and Resilience, the Italian government is supporting energy communities to generate renewable electricity, offering a total of 2.2 billion Euro (EUR) (2.3 billion US dollar [USD]) to support approximately 2 gigawatt (GW) of new, grid-connected renewable energy generation capacity in small municipalities with fewer than 5,000 inhabitants. The expected outcome is the annual generation of around 2.5 terawatt-hour (TWh) electricity and the avoidance of 1.5 million tonnes of greenhouse gas emissions per year by June 2026. Legislation on this topic is developing in Italy, with a resolution from the Italian Regulatory Authority for Energy, Networks and Environment (ARERA) defining the regulation of self-consumption published in January 2023.

One of the earliest examples of an energy community in Italy is in San Giovanni a Teduccio, in the East of Naples. The community is based around a Foundation that manages a socio-educational centre in the neighbourhood, and includes 40 disadvantaged families living in apartments next to the Foundation.

The aim of the project is for a PV system on the rooftop of the community centre to allow the centre to be energy autonomous, and to make any excess energy production available for the households to use. Tax deductions should cover 42% of the costs of the installation and the householders' use of energy from the system would be subsidised as it is considered 'shared energy'. The incentives, minus management fees, could total over 200,000 EUR (215,000 USD) over 20-25 years, and consumers could collectively save 300,000 EUR (320,00 USD) from lower consumption of grid-electricity.

Moreover, households involved in the community will receive social welfare services and training in renewable energy, monitoring of energy consumption and the thermal performance of their buildings.

Box 5. One step towards support for prosumers: legislation for prosumption in Romania



In 2018, the Romanian parliament adopted new legislation introducing the term 'prosumer', providing the legislative framework for small renewable energy generators to sell excess electricity back to the grid.

While this presents a big step towards improving macro boundaries for prosumption, there are further barriers that need to be addressed to fully empower consumers to adopt and benefit from prosumption.

An economic assessment of the viability of residential solar PV in Romania finds that low export prices compared to import price means that financial viability depends on a high proportion of self-consumption; under assumptions of levels of residential energy demand in Romania, the study concludes that only small PV systems of 3 kilowatt (kW)-6kW are likely to be financially viable for residential consumers.

Collective prosumption (e.g. through energy communities) could present an alternative and achieve high levels of (collective) self-consumption of larger PV solar systems. Meanwhile, Romanian legislation does not currently include provisions for energy communities beyond direct transposition of the EU Electricity Directive. This is not thought to provide sufficient legal clarity and there will need to be more precise definition to be useful to stakeholders. Moreover, households involved in the community will receive social welfare services and training in renewable energy, monitoring of energy consumption and the thermal performance of their buildings.

INNOVATIVE FINANCING

Beyond direct subsidy mechanisms, several countries are also trialling innovative financing models to further support consumer empowerment. This includes relatively simple measures such as providing access to lower than market interest loans. It can also include pay-as-you-save mechanisms, implemented by adding costs directly to bills (where the saving is automatically accounted for at the same time), leasing models to fund the higher upfront costs of uptake, or financing models with a lower interest rate that factor in the intrinsic benefit of energy efficiency and electrification. Efficient electric technologies enable sustained reduced operating expenditures that in turn increase the ability to repay the loans thus reducing financial risk. In a way, such tools would mirror what is already happening at the corporate finance level with green bonds or green guarantees.⁴⁸ There is also the possibility to regulate or offer additional incentives for companies to ease access for those who are more disadvantaged. This is particularly prevalent as a tool to increase uptake of building energy efficiency retrofits, and for uptake of efficient appliances and clean cooking technologies in low-income countries/areas with low levels of energy access.

Finally, consumers can have the opportunity to participate in the construction of new renewable facilities through remunerative crowdfunding schemes that offer consumers a financial return on top of the repayment of the initial investment – this is the case of the “Renewable Choice” initiative by Enel Green Power.⁴⁹

Box 6. Supporting consumers throughout the consumer journey: Casa Solar (Chile)



The Casa Solar programme in Chile, supports grid-connected solar PV through co-financing of rooftop solar on homes, has the potential to act across almost the entire range of the consumer journey by: increasing the affordability of the solution using bulk purchasing, government co-finance and loans from a public bank; enhancing trust via the administration of the scheme by a third party; and offering support to households during their early experience of using the system.

Through bulk purchasing and state co-financing, the programme increases affordability for households. Bulk purchasing reduces the cost of the installation by around 20% compared to retail prices, and through state co-financing cost to the household is further reduced by up to 50% compared to the market price. The household's contribution to the cost can be made from their own resources or through accessing a green loan from the Banco Estado.

The Casa Solar programme includes technical evaluation of properties and the selection of appropriate system size, supporting the selection of appropriate solutions and enabling consumers to make informed decisions. The delivery agency (Energy Sustainability Agency – AgenciaSE) provides support to households throughout the process and for one year thereafter.

48 At the corporate finance level, financial instruments capable of embedding more favourable economic conditions on the advantages of green technologies are starting to emerge: green guarantees, SACE website, <https://www.sace.it/soluzioni/dettaglio-categoria/dettaglio-prodotto/garanzie-green>; green bonds, Enel website, <https://www.enel.com/investors/investing/sustainable-finance/sustainability-linked-finance/sustainability-linked-bonds>.

49 ENEL GREEN POWER website, <https://www.enelgreenpower.com/countries/europe/Italy/renewable-choice>.

Box 7. International finance and sustainable energy assets for rural communities in Pakistan



KNOWLEDGE
AND
AWARENESS



AVAILABILITY
OF SAFE AND
AFFORDABLE
SOLUTIONS



IMPLEMENTATION



USE



MAINTENANCE,
REPAIR AND
REDRESS

The Cotton Inset Scheme aims to explore an alternative route to making renewable energy technologies financially accessible to rural communities in Pakistan. The programme will work with fashion brands to understand their carbon offsetting needs and the energy needs of the villages that produce the cotton used in their products. The brands can then offset their carbon by investing in renewable energy assets for these communities.

The investments will be financed by a combination of offsetting funds from the fashion retailers and local microfinance. Fashion brands will subsidise the upfront cost while microfinancing organisations will provide finance to households and micro-enterprises to enable the purchase of energy-using equipment such as fans and lights. The programme also offers the implementation of several microgrids and 'energy dhabas', which are small shops offering services such as charged battery rentals, solar home systems and refrigeration as a service.

The pilot scheme will monitor the impact of the investments, to enable the provision of robust impact estimates to the companies providing the initial funds. The project has installed one microgrid supplying 15 houses, set up five energy dhabas and is in talks with two international fashion brands and one microfinance organisation.

NEW BUSINESS MODELS AND MARKET STRUCTURES

The energy system transition is also resulting in discussion – and some trials – of more radical changes, some of which may lead to lower energy service costs. These changes include trialling innovative demand-side response services, which pay consumers for changing energy practices in ways that support grid operability. While such approaches may be more prevalent in higher income countries with mature, highly functioning electricity systems, smart energy solutions and demand-side response are receiving increasing attention globally.

Moreover, the changing nature of consumer engagement with energy, and the increasing emphasis on energy efficiency, gives rise to a need for new forms of business models, transforming traditional energy supplier models where value is attached to the provision of energy (megawatts), to models capable of valuing demand reduction through energy efficiency ('negawatts'). This may require new models for energy service provision, supporting consumers to achieve a level of energy service through a combination of support for energy efficiency improvements and (reduced) energy provision. This is a reversal of the traditional retailing role of utilities, and will require the decoupling of energy sales from revenues, as encouraged through the International Organization for Standardization (ISO) standard 50007.⁵⁰

⁵⁰ 'ISO 50001 – energy management', ISO, nd., <https://www.iso.org/iso-50001-energy-management.html>.

Box 8. Inclusive business model to engage residential and commercial consumers in self-generation and self-consumption in Spain



Endesa X, a multi-national energy company engaged in the transformation of the electricity sector, has commenced a pilot project in Zaragoza, Spain that will see the creation of a collective self-consumption configuration, where the energy produced by a solar PV plant will be jointly shared among the residents of the neighbourhood, in a 2km radius from where the PV plant will be located. The project entails the installation of a 100kW PV system, which will be constructed on the rooftop of one of the current headquarters of Endesa X, which will manage the development and administration of the PV plant and will encourage local citizens, and commercial and industrial consumers to take part in the project.

If successfully concluded, 20% of the electricity produced by the solar PV panels will be used to power part of the headquarters while the remaining 80% will be shared among the members participating in the scheme, enabling them to lower their energy expenses and reduce their electricity bills. Also, the PV installation, having the potential to supply electricity during grid outages due to extreme weather or other emergency situations, could significantly increase the resilience of the electricity system in the area.

Thus, Endesa X's pilot project would enable consumers who cannot install renewable energy generation assets on their own property (e.g. if they live in an apartment block, or in rented accommodations) to become prosumers, by offering them the opportunity to take part in the arrangement in exchange for a monthly fee. This will avoid the need for consumers to provide an initial investment that might disincentivise them from participating.

Additionally, the pilot project would offer the opportunity to engage in self-generation and self-consumption at a time when the interest for this type of scheme is quickly growing in Spain. In fact, since October 2018, when the Spanish government removed a set of tolls and charges to grid-connected distributed generation and storage assets, this reduced administrative burdens and associated installation costs, and as a result the solar self-consumption market experienced a boost, with self-consumption installations increasing by 108% in 2022 (vs 2021).

Box 9. Rewarding consumers for shifting and reducing energy consumption: OhmConnect (California, USA)



OhmConnect is a business that was established in California in 2014. It offers a free service to households in California who are customers of any of three participating utility companies (Pacific Gas & Electric, Southern California Edison and San Diego Gas & Electric). When electricity system constraints mean that the utilities are willing to pay customers to reduce demand, OhmConnect customers are notified in advance by text message and can earn money or rewards by reducing their energy use during the relevant period.

Households can reduce energy use by connecting appliances to smart plugs or installing smart thermostats, allowing the company to control them during the specified period, or they can choose to manually turn off appliances themselves. Energy demand reductions are calculated using smart meter data. Benefits to consumers include the money earned from supplying system benefits and also energy savings from using smarter technologies.

The company website offers very clear information on why they need to use customer utility data, how they keep it secure and a statement that they will never share it with advertisers or data brokers.

During the Californian heatwave in early September 2022, the electricity system came under sufficient strain for the grid operator to declare a stage three emergency, which is the final stage before blackouts commence. OhmConnect claim that action by their members to reduce energy use helped significantly in avoiding these blackouts over a 10-day period. Members collectively reduced their energy use over this period by 1.5 gigawatt-hour (GWh), earning more than 2 million USD in cash and rewards.

Box 10. Access, resilience, and affordability through microgrids and community-led renewables in South Africa



Microgrids offer an alternative to roll-out of a national electricity grid to even the remotest communities. There is evidence to suggest that they offer a lower-cost solution in some situations. In South Africa, microgrids are seen both as part of the solution to (slower than expected) roll-out of access to electricity and for ongoing system capacity issues.

One example is the microgrid serving Malachite Mews, a 216 unit housing complex in the eastern suburb of Johannesburg. Comprising 500kW of rooftop solar PV capacity and 672 kilowatt-hour (kWh) of battery storage capacity, this grid-connected microgrid offers residents both resilience against load shedding on the national grid and a potential opportunity to sell excess power to the grid. The system has successfully provided uninterrupted power to the development during a simulated eight-hour main grid power failure.

A community-based model of renewable energy generation is being piloted in three urban communities in South Africa, where community-led socially owned renewable energy projects aim to enable community investment in renewables, increasing the availability of affordable access to reliable energy supply and increasing community ownership of energy system assets. Moreover, using the installations as a focus for community education contributes to improving awareness and understanding of renewable energy, and seeks to build capacity in community organisations for locally-led renewable energy solutions.

PRODUCT STANDARDS AND STANDARDS OF PRACTICE

As new products and services emerge, the safety, quality, and efficiency of these must be ensured, to protect the safety of consumers, and to build consumer trust. To this end, product standards are an important tool, ensuring all market offerings meet minimum criteria.

In the case of new service offerings and innovative financing mechanisms, codes of practice are necessary both to facilitate trust in what may be highly complex offers, and to ensure consumers are treated fairly and with consideration for their circumstances. This may include a mix of voluntary or industry self-regulation, and formal government regulation in achieving these standards. For example, the Heat Trust Scheme in the UK provides assurance to heat network customers, and sets minimum standards for heat network providers, who are not subject to the regulation under supply licences in the UK. The Heat Trust Scheme has been running for seven years, and will form the basis for formal regulation as the UK heat network sector develops.

Delivery of the expected standards of practice also requires sufficient skill and experience within supply chains for the installation of equipment. The government can help to ensure that there is adequate training available for installers and implement training/qualification requirements linked to accreditation or certification schemes.

Box 11. Transforming the market for refrigeration and air conditioning technologies: Rwanda Cooling Initiative (R-COOL)



R-COOL is an initiative from the United For Efficiency (U4E) programme by the United Nations Environment Programme (UNEP), aiming to greatly improve the energy performance of refrigeration and air conditioning technologies on the market in Rwanda. The expected benefits are lower energy bills for consumers and lower peak electricity demands, as well as carbon emissions reduction.

Launched in 2018, the initiative has worked with government and other stakeholders to develop a national cooling strategy. The strategy's objectives include: establishing minimum energy performance standards for cooling equipment, with accompanying labels; ensuring access to information on cooling equipment; improving community awareness; and promoting innovative financing to help scale up adoption.

Several financing methods are being trialled, including 'Coolease' (a lease-purchase agreement where the cooling technology is used as collateral) for commercial consumers and an on-bill financial mechanism for household consumers.

R-COOL demonstrates how stakeholders can be brought together to develop a comprehensive approach to market transformation for an energy using technology. Consumers' economic interests are promoted through the minimum energy performance standards, information needs are addressed via labelling and innovative financing helps to remove the barrier of the initial investment costs.

The consumer benefits of this type of approach are heavily reliant on appropriate monitoring and enforcement of the minimum energy performance standards.

Box 12. Enabling and building confidence for domestic energy flexibility: winter Demand Flexibility Service and industry-led customer assurance (UK)



In the UK, the national electricity system operator is launching a Demand Flexibility Service for winter 2022-2023, to help address system balancing needs, and enable consumers, including households, to benefit from shifting demand in accordance with the needs of the grid. This is enabling suppliers and other service providers to develop innovative offerings for households. The outcomes of this service are yet to be seen, but previous trials in the UK demonstrate the potential of such services.

Notably, only consumers with smart meters will be able to participate in this service.

The emergence of energy flexibility offerings, such as these, marketed at households, has raised concerns about the lack of regulation of energy flexibility services and providers, and the need to build and maintain consumer trust. In recognition hereof, an industry-led project is developing a code of practice to define and encourage good practice by market participants in their engagement with existing and prospective customers (HOMEflex).

A key focus of information campaigns and customer support is the risk of households choosing to go without essential services for the sake of earning revenue/cost reductions. While this case study does not offer a clear answer to this concern, it serves as a reminder of the importance of designing services, and the protections and support measures around them, to ensure vulnerable consumers are adequately supported to take part and not disproportionately incentivised to take actions risking their health and safety.

Box 13. Delivering reduced emissions and equitable outcomes: Advanced Clean Cars II (ACCII) (California, USA)



ACCII is a proposed set of regulations that will gradually reduce the permitted levels of tailpipe emissions from new cars sold in California, to eventually reach zero by 2035, in line with the state's policy target. The proposal is particularly interesting for its focus on equity. Recognising the need to ensure that lower income households experience the benefits of reduced emissions, and that they can access the running cost benefits of EVs, the California Air Resources Board (CARB) actively aimed to design the regulations in a way that maximised their positive impact on equity. To do so, the development of the ACCII proposals was informed by the views of several consumer advocacy organisations, in addition to views gathered through public workshops and a community listening session.

The proposals address equity in three main ways:

- By increasing the share of EVs versus internal combustion engines (ICEs) on the roads, air quality is improved. This tends to disproportionately benefit lower income communities that currently live in the more polluted areas. In addition, the regulations also require reductions in tailpipe emissions from ICE vehicles, reinforcing this effect.
- The proposals contain zero-emission vehicle assurance measures. These include minimum warranty and durability requirements, increased serviceability, facilitating charging and battery labelling. While these measures are important for any consumer, they are seen as particularly valuable for lower-income consumers who will tend to purchase used rather than new vehicles.
- The proposals offer car manufacturers additional opportunities to comply with the legislation by taking action to improve access to zero-emission vehicles for low-income communities. These may include offering reduced price vehicles for community mobility programmes or producing affordable zero-emission vehicles.

Alongside the proposed regulations, there are several incentive programmes to increase affordability. These include rebates for both new and used clean cars, funding for charging options and support for alternatives to car ownership such as car sharing and ride hailing.

4.3 INVESTMENT/UPTAKE

In addition to the general availability of appropriate and affordable options in the market, consumers may face barriers to the practical uptake of these options at the stage of investing in or implementing new technologies and practices. This includes, for example, considerable administrative barriers in permitting processes or long wait times to accessing financial support. Several of the countries sampled have found new, more innovative approaches to removing these barriers and thus empowering consumers. This includes, for example, using online, automated permitting and reforming subsidy mechanisms to reduce wait times.

It is essential to consider the accessibility of different consumers to financing, particularly in the context of low-income and vulnerable consumers. The case of the Property Assessed Clean Energy (PACE) scheme in the USA, for energy efficiency investments, is one example where concerns about the potential risks for low-income households have been raised.⁵¹

Box 14. Removing barriers to investment and implementation of solar PV: the Solar Access Act (California, USA)



Administrative hassle and costs linked to consumer investment in new energy-related technologies are often a barrier to positive action from otherwise empowered consumers. They can thus act against the promotion of sustainable consumption patterns.

In California, the State Senate passed legislation requiring ‘instant online solar permitting’ for solar PV systems of up to 38.4kW. Instant online permitting involves the use of software that can review standard designs for solar installations, run compliance checks and process building permit approvals. It can also aid project tracking and provide an inspection checklist for use in final, post-installation sign-off.

The availability of technical solutions, including a free-to-use programme SolarAPP+ from the National Renewable Energy Laboratory, the exclusion of the smallest counties and a phased implementation based on settlement size, all help to address capacity constraints and support local authorities with gradual adoption. Moreover, support from the California Energy Commission through a 20 million USD grant programme aims to help cities and counties to adopt online permitting systems.

51 Polsky, C., Christensen, C, Ho, K., Ho, M., Ismailos, C., & Berkely Environmental Law Clinic, *The dark side of the sun – how PACE financing has under-delivered green benefits and harmed low-income homeowners*, 2021, <https://lawcat.berkeley.edu/record/1198493>.

Box 15. Removing the barrier of access to finance for green homes in Romania



Energy efficiency improvements and investment in renewable energy technology requires access to finance. The Romanian Green Building Council has led European work to overcome access issues by increasing consumer and finance provider confidence in the economic benefits of 'green' homes.

The SMARTER project, funded by the EU Horizon 2020 programme, involves expertise from 12 European countries. It is based on using the quality checking and information provided by green certification schemes to provide consumers and finance providers with the confidence that 'green' homes will deliver sustainability, health and financial benefits.

The provision of robust information to improve levels of confidence is the primary aim of the project. However, the fact that finance for the purchase of new homes is not useful to lower income households has led the project to also develop recommendations for policy and market actions that will unlock finance for green home renovations for low-income households.

4.4 EFFICIENT USE AND OPERATION

NEW PRACTICES AND SKILLS

In many cases analysed through this research, engaging in new practices will require learning new skills and habits. This is the case, for example, with respect to new forms of heating technologies that work differently to fossil fuel heating. For example, analysis of early trials of heat pumps in the UK demonstrated the need for users to understand that a different pattern of home heating is needed and that, once they did understand this, the system worked much more efficiently.⁵² It is also the case with respect to embracing new cooking techniques when shifting from existing, fossil fuel-based cooking technologies to electric cooking. Some programmes introducing clean cooking appliances offer workshops where consumers can learn how to use the new equipment or offer cookbooks that explain the benefits of clean cooking as well as offering tips on how to use the equipment effectively and safely and including recipes for how to cook popular dishes using it.⁵³

4.5 MAINTENANCE, REPAIR AND REDRESS

Particularly in the context of expanding access to clean cookstoves in Africa and South Asia, quality control of appliances is recognised as a crucial element of uptake, and the need for improved supply chain practices, maintenance and repair services is highlighted to prevent loss of consumer confidence.⁵⁴

Access to redress in the event of faults is essential to build consumer trust and protect consumers from negative outcomes. This may be provided by established consumer authorities, either economy-wide or energy-specific. In case of unregulated actors, redress for consumers can be facilitated through alternative dispute resolution mechanisms or through schemes established to provide access to existing redress mechanisms in the energy sector. This is for example the case with the Heat Trust Scheme in the UK, which provides access to the Energy Ombudsman for heat network customers (with heat networks being unregulated in the UK).

⁵² Caird, S., Roy, R., & Potter, S, 'Domestic heat pumps in the UK: user behaviour, satisfaction and performance', 2012 https://www.researchgate.net/publication/257768241_Domestic_heat_pumps_in_the_UK_User_behaviour_satisfaction_and_performance.

⁵³ See, for example, MECS website, <https://mecs.org.uk/ecookbooks/>.

⁵⁴ See for example, the Modern Energy Cooking Services programme market assessments for clean cooking, such as: Bisaga, I., & Menyeh, B, 'Rwanda eCooking market assessment', 2022, <https://mecs.org.uk/wp-content/uploads/2022/02/MECS-FnDev-Rwanda-eCooking-Market-Assessment.pdf>.

Box 16. Socialising support for essential energy services in Brazil



'Mais Luz para a Amazônia (More Light for the Amazon)' is a Federal Government programme set up in 2020 that aims to ensure access to electricity from renewable sources. The programme will support approximately 220,000 families living in remote areas in Brazil's Legal Amazon region, including riverside, indigenous and quilombola communities, with new electricity connections.

These communities cannot be served by the conventional power grid due to the remoteness of their locations, and therefore have either no access to electricity or are reliant on diesel or gasoline generators. Through this programme the government aims to increase access to solar PV for home electricity generation.

The programme will not impose a financial burden on the target communities and will instead be financed from the Energy Development Account (a sectoral charge levied on consumers via inclusion in the transmission and distribution system tariffs) and from government sources. Thus, supporting UN legitimate need 1 (access to essential goods and services) and need 2 (protection of vulnerable and disadvantaged consumers).*

Previous schemes to install PV systems in Brazil had high-failure rates due to the lack of local operation and maintenance skills, and it is not clear whether 'Mais Luz para a Amazônia (More Light for the Amazon)' is paying sufficient attention to developing these skills within local communities.

* Source: UN General Assembly (70th sess.: 2015-2016), 'Resolution adopted by the General Assembly on 22 December 2015: 70/186. Consumer protection, A/RES/70/186', 2016, <https://digitallibrary.un.org/record/820876>.

4.6 CONSUMER REPRESENTATION

An important overarching insight from this work is the need for more interaction among energy system designers, policy-makers and consumer protection and representation organisations. This is vital to ensure consumers are supported and protected through the energy transitions, their needs and rights recognised and their voices represented. Thus, the consumer protection and empowerment ecosystem have a critical role to play in facilitating 'energy citizenship', representing the voice and interests of consumers and bridging the gap between consumers and decision-makers in energy transitions.

Stakeholder engagement informing this project highlights the often limited interaction between consumer and energy actors, and the challenges for consumer advocacy professionals in engaging in the highly technical and complex field of energy transitions, energy markets and regulation.

Addressing this overarching barrier can be considered a prerequisite to addressing the more specific barriers discussed below, as a first step towards putting people at the heart of energy transitions, representing the voice and interests of consumers and bridging the gap between consumers and decision-makers in energy transitions.

On the other hand, energy players have an opportunity – and responsibility – to focus on consumers and shaping their strategies around their needs.

Tools such as relational or transactional metrics introduced for listening to the voice of the consumer at specific touchpoints in the consumer journey are key to measuring their level of satisfaction. In this way, it is possible to push more on service simplification and a better customer experience, so they will be more engaged and aware of the entire process. Marketing sensible options that align the need for decarbonisation and the needs of customers is crucial to the achievement of the common objective of a truly sustainable energy system. The organisations succeeding at this will be capable of contributing the most to this challenge and at the same time to benefit from it as they will more easily encounter the favour of the customers.

5. CONSUMER PROTECTION AND EMPOWERMENT: INTERVENTIONS AND ACTORS

This chapter provides an overview of some of the types of interventions and associated actors, which can contribute to the protection and empowerment of consumers in energy transitions.

In addition to specific interventions (see Table 4), it is important to note the overarching finding mentioned above: energy system designers, policy-makers and consumer protection and representation organisations need to interact more to make sure that the consumer perspective is considered and appropriately leveraged upon in the process of energy transition: putting consumers' perspective at the centre of energy transition is a powerful tool to make it happen more quickly and effectively. Stakeholder engagement informing this project highlights the often limited interaction between these spheres and the challenges for consumer advocacy professionals in engaging in the highly technical and complex field of energy transition, energy markets and regulation. This is supported by responses to a recent survey of consumer advocacy organisations,⁵⁵ which highlights the need and wish among these organisations for more information around price increases and energy shortages, guidance on actions needed from national governments and support for consumer protection advocacy through international collective campaigns. The same survey illustrates the current focus primarily on information to consumers on how to 'shop smartly' in the current cost of living crisis and collection of data on prices (82% and 63% of respondents, respectively), with a minority of respondents reporting activities around advocacy for price controls (44% of respondents), measures to strengthen consumer purchasing power (36% of respondents) and increased competition (33% of respondents).

Consumer advocacy groups have the potential to play a key role in ensuring that consumers are adequately represented in the energy transition and in policy-making for clean energy futures, and in driving more joined-up policy-making across consumer and energy policy arenas. To realise this potential, these groups need the skills and resources to be able to engage effectively with the energy sector and energy policy-makers and regulators.

This project aims to encourage this interaction and provide a starting point for conversations and action in this space. We also note the crucial role of commercial organisation in better aligning their offers with consumers' needs, by putting the consumer at the centre of the design of new products and services.

While limited in scope and non-exhaustive, Table 4 sets out some of the types of interventions, which may need to be considered, and the types of actors who will need to be at the table.

⁵⁵ Consumer International, 'Membership survey', 2022.

Table 4. Interventions and key actors involved in consumer protection and empowerment

		Intervention types	Considerations	Key actors
		Consumer representation in energy policy/decision-making processes	<ul style="list-style-type: none"> • Requires sufficient resourcing and sector-specific expertise on the part of consumer organisations • Formal processes/spaces 	<ul style="list-style-type: none"> • Energy policy-makers and regulators • Consumer organisations
Awareness and understanding		Labelling schemes	<ul style="list-style-type: none"> • Consistency and clarity in labelling is key to facilitate consumer understanding 	<ul style="list-style-type: none"> • Consumer organisations • Energy policy-makers
		Information/awareness/education campaigns	<ul style="list-style-type: none"> • There is little evidence of the effectiveness of awareness campaigns, but based on stakeholder experience, long-running awareness raising efforts can influence societal perceptions, narratives, and understandings. Educational interventions may be effective in combination with broader consumer support programmes 	<ul style="list-style-type: none"> • Consumer organisations • Energy policy-makers • Ecosystem actors involved in programme design and service/product provision
		Transparency	<ul style="list-style-type: none"> • Improve consumer confidence by ensuring that consumers can see the full picture • Ensure that communication is clear and understandable by consumers 	<ul style="list-style-type: none"> • Energy system regulators • Consumer protection authorities • Ecosystem actors involved in promoting new products and services

		Intervention types	Considerations	Key actors
			Market design	<ul style="list-style-type: none"> To deliver consumer-centred transitions, markets will need to find new ways of capturing value and incentivising and rewarding sustainable practices
Market availability of suitable, safe and affordable options	Direct policy support	Subsidy schemes	<ul style="list-style-type: none"> Remove administrative burdens from subsidy schemes to make them accessible to more people and easier for industry to implement Consider relevant targeting in line with equity/justice principles Uptake depends on consumer awareness of the opportunity Remove schemes designed to incentivise technology based on polluting energy resources, to avoid dispersion of efforts 	<ul style="list-style-type: none"> Energy policy-makers Consumer organisations Ecosystem actors involved in subsidised service/product provision
		Tax measures	<ul style="list-style-type: none"> Ensure alignment with clean energy goals Analyse distributive impacts 	<ul style="list-style-type: none"> Tax authorities Energy policy-makers and regulators
		Grant schemes	<ul style="list-style-type: none"> Remove administrative burdens from subsidy schemes to make them accessible to more people and easier for industry to implement. Consider relevant targeting in line with equity/justice principles Uptake depends on consumer awareness of the opportunity Remove schemes designed to incentivise technology based on polluting energy resources, to avoid dispersion of efforts 	<ul style="list-style-type: none"> Energy policy-makers Ecosystem actors involved in subsidised service/product provision
		Credit provision/loans	<ul style="list-style-type: none"> Consider appropriateness for different consumers/'ability to pay back' Consumer protection essential 	<ul style="list-style-type: none"> Consumer organisations Consumer protection authorities Energy regulators Financial regulators
	Innovative financing	Leasing models	<ul style="list-style-type: none"> Similar to those for credit provision 	<ul style="list-style-type: none"> Consumer organisations Consumer protection authorities Financial regulators
		Collective purchasing models	<ul style="list-style-type: none"> Ensure access to low-income consumers Ensure transparency so that consumers are sure that the offer is the most beneficial one for them 	<ul style="list-style-type: none"> Energy policy-makers and regulators Consumer protection organisations Financial regulators Ecosystem actors involved in communal action

		Intervention types	Considerations	Key actors
	New business models and market structures	Innovation support	<ul style="list-style-type: none"> Emergence of new business models may introduce new risks as well as the opportunities they present, with new actors and services potentially unregulated, requiring ways to enforce standards and fair treatment of consumers 	<ul style="list-style-type: none"> Innovation ecosystem Ecosystem actors involved in energy service/product provision Consumer organisations Energy regulators
		Product standards and standards of practice	Quality standards	<ul style="list-style-type: none"> Need to be clearly understandable for consumers: avoid multiple standards covering one product as this can be confusing and reduce consumer confidence
	Minimum efficiency standards		<ul style="list-style-type: none"> Efficiency standards are effective as a tool to improve the energy efficiency of products on the market over time 	<ul style="list-style-type: none"> Energy policy-makers and regulators Energy sector and ecosystem actors involved in service/product provision Consumer protection organisations
	Certification schemes		<ul style="list-style-type: none"> These may be voluntary or formally regulated. Consideration must be given to the level of flexibility required to enable innovation (conducive to voluntary schemes), vs the severity of the need for compliance 	<ul style="list-style-type: none"> Energy policy-makers and regulators Energy sector and ecosystem actors involved in service/product provision Consumer protection organisations
	Digital protection		<ul style="list-style-type: none"> Robust protections needed to build consumer confidence in the data sharing required for digital solutions 	<ul style="list-style-type: none"> Energy (and broader) policy-makers and regulators Energy sector actors Consumer protection organisations
Investment/uptake		Reduced or automated administrative processes	<ul style="list-style-type: none"> Ensure that processes are understandable for consumers and easy to complete Ensure that processes do not introduce extended delays into purchase and installation 	<ul style="list-style-type: none"> Consumer organisations Ecosystem actors involved in programme design and service/product provision Planning and permitting authorities Legislators

		Intervention types	Considerations	Key actors
Use and operation		New practices and skills	<ul style="list-style-type: none"> • Clear instructions and easy-to-access training (e.g. video tutorials) are needed • Peer-to-peer experience sharing will also be important 	<ul style="list-style-type: none"> • Device manufacturers and installers • Energy sector actors • Informal consumer groups (e.g. via social media)
Maintenance, repair and redress		Support for local supply chains to provide after sales support	<ul style="list-style-type: none"> • Ensure that supply chains for new equipment include sufficient local expertise that maintenance and repair is possible/easy for consumers 	<ul style="list-style-type: none"> • Energy policy-makers • Ecosystem actors involved in skills development
		Standards of practice for supply chain actors and standards/ requirements for maintenance and repair services	<ul style="list-style-type: none"> • Processes to develop standards of practice must be agile enough to respond to fast pace of change as innovative products and services are introduced to the market 	<ul style="list-style-type: none"> • Energy policy-makers • Consumer protection authorities • Ecosystem actors involved in skills development
		Access to redress or alternative dispute resolution	<ul style="list-style-type: none"> • In the case of new emerging business models, actors may be unregulated and not subject to existing redress mechanisms, in which case alternative arrangements should be made 	<ul style="list-style-type: none"> • Energy (and broader) regulators • Consumer organisations

6. DISCUSSION

We are all consumers of energy services. Therefore, we are all crucial actors in the change to a fair, net zero energy system.

Key aspects and enablers of the transition – such as electrification, efficiency, digitalisation and decentralisation – all depend on consumer action. There is no realistic pathway to electrifying end-uses that does not mobilise individual consumer investment at scale.

To date, although it is well beyond doubt that consumers' behavioural changes⁵⁶ are crucial, decision-makers have been somehow reluctant to focus their efforts on the consumer-side of the energy transition. One reason may be that individual behavioural changes are perceived to be too politically contentious and difficult to implement when compared to supply side and technological changes⁵⁷. This does not have to be the case, for two main reasons:

- **Energy systems stand to benefit from consumer action:** action by consumers is key to unlocking supply side changes that would otherwise not be possible, such as the transition to an electricity system based primarily on renewable sources and the affordable decarbonisation of heat. As the adoption of time-of-use or dynamic tariffs has demonstrated, consumers have no problem in changing and adapting their behaviours with the right equipment (e.g. heat pumps, smart meters), well-targeted encouragement, and the appropriate market signal.
- **Consumers stand to benefit from the action they take:** for example in the form of lower bills, healthier homes and cleaner air. The extent to which informed consumers will resist changes is easy to overestimate. Consumers will make the real sacrifice if they are not given the opportunity to be part of the change – in the form of high and volatile bills, poorer health, and an unsafe climate.

To illustrate this, here are just four examples of where consumer empowerment can deliver a win-win-win for individuals, energy systems and the environment:

- **Reducing the need for emergency subsidies in response to the energy price crisis:** the severe impact on household and business finances of the recent energy price increases has highlighted the need for greater resilience. If consumers are empowered to improve the energy efficiency of their homes and appliances and hence reduce their energy use, this will help to deliver the resilience they need. It can also reduce the need for investment in the supply system and will deliver emissions reduction now and for the longer term.

56 IEA, 'How to avoid gas shortages in the European Union in 2023', 2022, <https://www.iea.org/reports/how-to-avoid-gas-shortages-in-the-european-union-in-2023>

57 Creutzig, F., Fernandez, B., Haberl, H., Khosla, R., Mulugetta, Y., & Seto, K.C. 'Annual Review of Environment and Resources', Beyond technology: demand-side solutions for climate change mitigation, 41 (1), 01/11/16; Hardt, L., Brockway, P., Taylor, P., Barrett, J., Gross, R., & Heptonstall, P. 'Modelling demand-side energy policies for climate change mitigation in the UK: a rapid evidence assessment', 2019, https://d2e1qxpswwcpqz.cloudfront.net/uploads/2020/03/wp_modelling_demand_side_energy_policies_in_the_uk_rea.pdf.

- **Expanding access to clean energy services:** efficient appliances can ‘reduce electricity demand for typical energy services by up to two-thirds’.⁵⁸ Empowering consumers to purchase safe and efficient technologies is not only important in building resilience to price shocks; it can also be crucial to enabling clean and affordable access to clean energy services for those currently without them, as it reduces the cost of building the supply system and makes running costs cheaper for users.
- **Reducing total system costs and making best use of renewables:** demand flexibility increases overall system efficiency by smoothing demand peaks, thus reducing the need to build and use power stations that are only required to meet peak demand and hence only used for a small proportion of time. It also enables maximum use of renewable generation by matching demand with supply. Empowering consumers to offer flexibility to the system enables them to benefit directly from financial rewards as well as indirectly via lower system costs. Overall, maximising the use of renewables and minimising the use of fossil fuelled power stations reduces carbon emissions.
- **Increasing access to ownership of renewable generation and improving the resilience of the grid:** energy communities are an effective arrangement to increase access to clean generation and reduce consumers energy expenditures. They also increase power network resiliency and avoid net losses due to the proximity between generation and consumption. Energy communities that encourage people in proximity to the power plant to consume energy at times of energy production can drive flexibility services benefiting the entire system.

This White Paper has reviewed the state of consumer protection and empowerment across 11 countries to outline:

- the typical barriers experienced at each stage of a consumer’s journey (Chapter 3)
- the typical interventions needed to remove barriers and the agents that could perform them (Chapter 5).

If the net zero carbon energy system that we are creating is founded on the principle of making consumers lives better, the power of consumer action can be unleashed. A consumer-centric approach is of paramount importance for all the actors involved. Organisations designing policies, regulations and market offers should start from the question: What problem can I solve for the consumer? This question should be asked at all stages of a consumer’s interaction with a product or service, from initial awareness, through purchase and use, to maintenance and repair. For example: Will consumers understand and trust the information they are being given?; Are they able to see the full picture?; Are support schemes administratively easy for consumers to access?; and Are there local firms able to offer effective and timely maintenance and repair of new systems? This is the only way through which utilities and other energy stakeholders will be able not only to provide additional value to final consumers but also the necessary inclusion and involvement that the energy transition needs from end users.

One of the reasons why so many barriers persist is that the types of co-operation required to remove them do not currently exist. For example, the consumer representatives who participated in our research were unaware of much of the detail of relevant energy policy and market action in their countries and were clear that their expertise was not called upon in the processes of designing energy policy and regulation.

58 IEA, IRENA, UN., World Bank., & WHO, ‘Tracking SDG 7: the energy progress report 2021’, 2021, <https://www.iea.org/reports/tracking-sdg7-the-energy-progress-report-2022>.

7. RECOMMENDATIONS

We are calling for a step-change in the way stakeholders work together to protect and empower consumers in the energy system. Three types of cross-cutting collaboration are required and are discussed below.

7.1 COLLABORATION TO ALIGN ENERGY AND CONSUMER POLICY AT NATIONAL AND INTERNATIONAL LEVELS

Beyond achieving goals of affordable, clean energy (SDG7), consumer and energy policy needs to be aligned under joint goals of:

- removing barriers to the adoption of clean energy practices across the entire consumer journey
- protecting consumers and guaranteeing trust, rights, and confidence at every stage.

Enhanced collaboration between consumer and energy policy-makers will likely make it much easier to reach a range of localised policy objectives. The muddle of conflicting taxes and subsidies in energy is a revealing example. We need to introduce effective subsidies and financing that will help consumers afford cleaner technologies that might currently require a larger upfront investment than their fossil fuelled alternatives while delivering savings in the long run. The resulting increase in demand for the newer technologies and learning in the marketplace would eventually reduce costs such that subsidies were no longer required. However, at present we see many examples of subsidies for consumers who are using polluting technologies alongside, or instead of, subsidies for clean technologies. These may be driven by calls for protection of lower income consumers but are to the detriment of all consumers as they inevitably delay the uptake of clean energy technology and prevent consumers from benefiting from its advantages: lower bills; better air quality; and, in the long run, protection from the consequences from climate change. Greater understanding and collaboration between those governing the energy markets and those acting to protect consumers would help to avoid such perverse outcomes.

Consumer and energy policy, which are of core importance to the twin goals of empowering and protecting consumers in the transition, should in turn be harmonised with other key policy and market areas.

Mechanisms for facilitating a step-change in co-operation include:

- national policy-making forums that bring together diverse actors under a specific mandate guided by key performance indicators
- developing cross-cutting expertise through hiring energy specialists to work in consumer policy-making organisations and hiring consumer specialists to work in energy policy-making organisations
- consumer advocates acting as convenors or representing consumer interests and rights principles to energy policy-makers and regulators.⁵⁹

⁵⁹ Note that this requires sufficient resourcing and sector-specific expertise on the part of consumer organisations. Successful examples include: the joint '2030 Vision for Energy Consumers' created by the European Consumer Organisation (BEUC) and

At national level, our White Paper has identified the following key areas for joint projects between consumer protection authorities, energy policy-makers and regulators and financial market institutions:

- **Innovative financing** capable of conveniently factoring in the financial scheme the energy savings attainable with the energy efficiency overhauls and equipment installation, so to provide consumers with access to suitable, safe and affordable options, such as credit provision, leasing models and collective purchasing models.
- **Product standards and standards of practice**, for example quality standards, minimum efficiency standards, certification schemes and robust protection when sharing data.
- Promoting consumer **awareness and understanding**, for example by ensuring transparency and reliable information provision.
- **Requirements or standards of practice** for maintenance and repair services.

At international level:

- Bringing energy stakeholders into dialogue with the Intergovernmental Group of Experts on Consumer Protection Law and Policy, to support UN member states' commitment to implement consumer policies that deliver clean and affordable energy for all.
- Co-operation between cross-border networks of consumer and energy regulators to fully define principles of how the consumer perspective can be integrated into energy regulation and vice-versa.

7.2 COLLABORATION TO SUPPORT MARKET OFFERS AND BUSINESS MODELS THAT PROTECT AND EMPOWER CONSUMERS BY DESIGN

The role of energy utilities and others offering energy services to consumers will be crucial for the energy transition. If they progress in understanding the needs of the consumer and the ways in which clean energy solutions can satisfy these needs, they will be able to develop successful market offerings and help consumers to see and benefit from their full value. It is also important that the regulatory and policy framework within which they work enables them to innovate to deliver the solutions that consumers want.

Cross-cutting collaboration can help market players to create market offers and shape business models that protect and empower consumers by design:

- **Market offers:** for example, energy companies, consumer associations and other stakeholders can work together to help create a one-stop shop for consumers and enterprises to find correct and verified information on green technologies (heat pumps, EVs, etc.); what offers are available in the market; and what incentives exist that can make the acquisition of these bundles affordable for consumers (including low-income families).
- **Business models:** for example, utilities evolving from energy vendors to energy service providers offering help to consumers seeking improvements in energy efficiency – selling 'negawatts' as opposed to 'megawatts'. This approach is built into the ISO standard 50007, drafted by Consumers International:

The energy service providers, (as well as relevant authorities) should all seek to ensure that a satisfactory level of energy efficiency service is available to all users, providing general information on the efficiency opportunities available, their costs and benefits, where they can be acquired, and incidental benefits or conditions, and furthermore, financial incentives or services that may be available to the user.⁶⁰

In many cases it is competition law or consumer protection law that stands in the way of shifting business models: collaboration can find solutions to these barriers.

7.3 COLLABORATION TO SCALE DATA AND INTELLIGENCE ON THE CONSUMER-SIDE OF ENERGY TRANSITIONS

The publicly available international datasets that track progress on the energy transition tend to focus on the growth in renewable energy technologies and levels of carbon emissions. We need to see more information on the consumer experience: levels of access to affordable energy services (not just access to the electricity grid); degree of achievement of the economic benefits (savings) of the energy transition; understanding of, and trust in, clean energy solutions; and access to clean transport options. Increased data collection and analysis can support new modelling on how consumer action can contribute to tipping points in the energy transition. This will be key to targeting and prioritising future interventions.

We want to see international energy organisations such as the IEA and the World Energy Council working with international consumer organisations to strengthen or develop these metrics and publish progress updates.

7.4 A WAY FORWARD

To advance the cross-cutting collaborations we need, in 2023 Consumers International will launch a new multi-stakeholder initiative together with its key partners. **CLEAN** – the **Consumer Led Energy Action Network** – will convene global consumer advocates with business, government, and civil society leaders to collectively advocate for, design, and support interventions that protect and empower consumers in the transition to a clean energy system.

This White Paper is an invitation to connect, learn, and build together with leaders from all types of stakeholders who want to see change in energy systems with and for consumers. We welcome feedback and suggestions as we embark on our roadmap with and for consumers everywhere.

⁶⁰ ISO 50007 – energy services, ISO, nd., <https://www.iso.org/standard/51870.html>.

GLOSSARY

Clean energy: renewable energy supply that does not result in emissions that are harmful to human health or the environment.

Consumer journey: the series of interactions that a consumer has with a product or service, from becoming aware of its existence through purchase and use, to maintenance and repair.

Demand-side response: actions taken by energy users to respond to signals from the energy system and in doing so to improve the performance of the system as a whole.

Energy poverty: the inability to afford a level of energy services that meets fundamental needs and hence maintains health and well-being.

Energy services: the services provided to the consumer by the use of energy.

Flexibility: the ability and willingness of energy users to shift the timing of their energy demand to better match the availability of the energy supply.

Practices: frequent, often habitual, sets of behaviours that are used to achieve a goal.

Prosumption: production and supply of energy by energy consumers, for example the production of electricity from a consumer's PV system and the export to the grid of any electricity not used by the consumer.

Smart energy solutions: the use of digital technology (including technologies owned by energy users) and data processing to ensure that the energy system operates as efficiently as possible.

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**CONSUMERS
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COMING TOGETHER
FOR CHANGE

Consumers International brings together over 200 member organisations in more than 100 countries to empower and champion the rights of consumers everywhere. We are their voice in international policy-making forums and the global marketplace to ensure they are treated safely, fairly and honestly.

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