ASSERT

Large-scale multiactor training and mentorship programme to ASSist people with physical impairments in energy povERTy

D2.2 Report on Needs, Comfort Expectations and Energy Practices of Energy Poor Disabled People

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Author(s)	Sana Fatima Ali Annamaria Belleri Giulia Torriani Federico Voltolini
Leading partner:	Eurac Research
Contributors:	AISFOR SRL RETE ASSIST ENERCOOP ECOSERVEIS CCR CEA CLIMATE ALLIANCE NTUA IEECP
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ABOUT ASSERT

The ASSERT project is a European initiative under the LIFE23-CET-ENERPOV framework, which will address the critical issue of energy poverty, particularly among physically disabled persons.

The project goal is three-fold:

1. Ensure that policy makers at all levels of administrations, as well as energy practitioners and advisors are trained on energy matters, including on topics related to energy poverty, taking into consideration the multidimensional aspects of energy poverty and context of clean energy transition.
2. Roll-out programmes to train front line workers in energy poverty and green energy solutions. Front-line workers addressed in those programmes should include health and social care workers or other professionals who can help identify households affected and provide them with advice and information on solutions to reduce energy consumption and access more affordable and innovative sources.
3. Offer targeted training courses for energy-poor households affected by energy poverty, including those with low digital skills. Such courses should enhance the energy and digital literacy awareness of households affected by energy poverty, enable them to better control their energy bills and participate actively in the clean and just energy transition.

ASSERT will focus on persons with physical disabilities who have higher energy needs and lower income and therefore are more susceptible to energy poverty and its effects. Addressing their needs can interrupt the vicious circle of aggravating health conditions as a consequence of unhealthy household conditions due to energy poverty.

The project will deliver an integrated target-specific training and mentorship programme for local policymakers and intermediaries, and will equip them with essential skills and knowledge and support to implement sustainable energy solutions, while integrating energy poverty considerations into broader policy frameworks.

ASSERT consortium

No	Participant organisation name	Short name	Country
1	AISFOR SRL	AISFOR SRL	IT
2	RETE ASSIST - ETS	RETE ASSIST - ETS	IT
3	ENERCOOP	ENERCOOP	FR
4	ASOCIACION ECOSERVEIS	ECOSERVEIS	ES
5	CITIZEN CROSSROADS	CCR	EL
6	ENERGEIAKO GRAFEIO KYPROU	CEA	CY
7	CLIMATE ALLIANCE - KLIMA-BUENDNIS - ALIANZA DEL CLIMA e.V.	CLIMATE ALLIANCE	DE
8	EUROPEAN NETWORK ON INDEPENDENT LIVING BRUSSELS OFFICE	ENIL	BE
9	ETHNICON METSOVION POLYTECHNION	NTUA	EL
10	INSTITUTE FOR EUROPEAN ENERGY AND CLIMATE POLICY STICHTING	IEECP	NL
11	ACCADEMIA EUROPEA DI BOLZANO	EURAC	IT

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Glossary

Acronym	Definition
AC	Air-conditioner
DPO	Disabled People's Organization
GDPR	General Data Protection Regulation
ISEE	Equivalent Economic Situation Indicator
LPG	Liquefied Petroleum Gas
NGO	Non-Governmental Organisation
PV	Photovoltaic

Executive summary

People with disabilities face a structurally heightened risk of energy poverty, as their energy use is closely tied to health, safety, care and autonomy rather than discretionary comfort. This report presents a cross-country analysis of the needs, comfort expectations and everyday energy practices of people with disabilities experiencing, or at risk of, energy poverty in five Southern European pilot countries: Cyprus, France, Greece, Italy and Spain. Drawing on focus groups, interviews, proxy contributions and survey data, it provides evidence-based insights into how disability-related energy needs intersect with housing conditions, climate exposure, financial constraints and support systems.

Across all countries, participants reported **higher baseline energy needs** driven by medically required thermal comfort, long daily occupancy, and reliance on assistive or medical devices that require continuous electricity. Energy use was consistently described as essential for survival, functioning and dignity, leaving little scope for behavioural reduction without adverse health consequences. Common cross-cutting challenges included rising electricity costs, poorly insulated or inaccessible housing, limited control over heating and cooling systems, and insufficient recognition of disability-related energy needs within existing support schemes.

At the same time, important **country-specific differences emerged**, reflecting variations in housing conditions, affordability, infrastructure and support systems rather than fundamentally different needs. In **Cyprus, Greece and Spain**, prolonged summer heat combined with high electricity costs and limited building performance intensified dependence on cooling, while constraining households' ability to maintain safe indoor temperatures. In **France**, experiences were shaped by urban housing conditions, high dependence on electricity for medical equipment, and limited reimbursement mechanisms for energy-intensive health needs. In **Italy**, high electricity dependence coexisted with relatively greater familiarity with home automation and expressed aspirations for self-sufficiency, alongside frustration with complex billing systems and the limited feasibility of renewable solutions in apartment-based housing. Across all countries, both summer overheating and winter heating needs were reported, but their impacts were mediated by differences in housing stock, tenure arrangements and access to financial and technical support.

Housing conditions played a decisive role across all pilots. Many participants lived in older multi-storey buildings with poor insulation, shared heating systems or physical barriers that restricted ventilation and individual control. Renters and residents in shared buildings were often unable to install air conditioning, renewable energy systems or efficiency upgrades, reinforcing dependence on

inefficient and costly solutions. These structural constraints were compounded by financial vulnerability: disability allowances and energy subsidies were widely reported as insufficient, poorly targeted or inaccessible due to complex administrative procedures and eligibility criteria that fail to reflect real disability-related costs.

The findings also reveal significant gaps in **digital and energy literacy**, with uneven access to smart technologies and widespread difficulties navigating online information, billing systems and support schemes. While digital tools and home automation were recognised as potentially beneficial for autonomy and energy management, particularly in Italy and France, high costs, limited accessibility and lack of tailored guidance prevented wider uptake. Participants across all countries expressed a strong demand for clear, accessible and disability-sensitive communication formats.

Holistically, this report demonstrates that energy poverty among people with disabilities is not primarily a result of inefficient behaviour, but of **structural, medical and accessibility-related factors**. It emphasizes the need for energy poverty policies, renovation programmes, renewable energy initiatives and support schemes to explicitly recognise disability as a driver of vulnerability. The evidence presented here provides a robust foundation for the development of inclusive training materials, mentoring pathways and policy recommendations within the ASSERT project, aimed at reducing energy vulnerability without compromising health, safety or autonomy.

1. Introduction

Energy poverty is commonly defined as a condition in which households are unable to secure adequate levels of energy services, such as heating, cooling, lighting, and power for essential appliances, necessary to maintain health, comfort, and social participation (Bouzarovski, 2014; Bouzarovski & Petrova, 2015). Whereas energy vulnerability refers to the broader set of structural, social, economic, and institutional factors that increase the risk of experiencing energy poverty. This concept emphasises that exposure to energy deprivation is not solely income-driven, but shaped by housing quality, health status, tenure conditions, energy systems, and access to support mechanisms (Bouzarovski, 2014; Ivanova & Middlemiss, 2021). These dimensions are particularly relevant for population groups whose energy needs are shaped by health, care, and accessibility requirements.

People with disabilities across Europe face a disproportionately high risk of energy poverty (Bouzarovski & Petrova, 2015; Ivanova & Middlemiss, 2021). Many rely on medical and assistive devices that require continuous electricity (Casey et al., 2021), have more stringent thermal comfort needs, or spend long hours at home due to mobility, health or social barriers. (Friedman, 2022; Shapira & Teschner, 2023). At the same time, factors that affect energy-poor households, in general, such as inaccessible or inefficient buildings, high energy prices and limited access to tailored support schemes, have disproportionate impacts on people with disabilities. This is because they often require higher and more stable indoor comfort levels, depend on energy-intensive devices, and face additional barriers to making adaptation or accessing assistance (Bouzarovski, 2014; Carley et al., 2024; Casey et al., 2021; Ivanova & Middlemiss, 2021). Despite this, disability-specific aspects of energy poverty remain largely absent from mainstream energy, housing and social-policy frameworks. The ASSERT project addresses this gap by developing inclusive knowledge, training, and policy recommendations that recognise the lived experiences and needs of people with disabilities.

This report on the 'Needs, Comfort Expectations and Energy Practices of Energy Poor Disabled People' (D2.2) aims to provide a consolidated cross-country analysis spanning predominantly Mediterranean contexts in Southern Europe, examining the needs, challenges and everyday practices of energy-poor disabled people in the five ASSERT pilot countries: Cyprus, France, Greece, Italy, and Spain. The findings presented here serve as a foundation for the development of inclusive training materials, personalised mentorship and support pathways, and policy recommendations targeting service providers and public authorities.

1.1. Structure of the Report

This report is organised into five main sections:

- Section 1 introduces the scope of the report, outlining its purpose, analytical focus, methodological approach, and the national pilot contexts included in the analysis.
- Section 2 presents cross-country findings (participant profiles, energy use, comfort expectations, well-being impacts, behavioural practices, housing conditions, financial vulnerability, digital literacy and attitudes toward renewable energy).
- Section 3 synthesises results from a broader policy perspective.
- Section 4 provides the conclusions and describes implications for future training, support actions, and policy development
- Section 5 contains the Toolkit and the individual pilot reports as appendices.

1.2. Analytical Focus and Contribution of the 'Report on Needs, Comfort Expectations and Energy Practices of Energy Poor Disabled People' (D2.2)

The primary analytical focus of this report D2.2 is to analyse the real-world experiences of people with disabilities who are in a situation of energy poverty or at heightened risk of it, living in diverse climatic, social and housing contexts. Building on the qualitative survey-based evidence from the five pilot countries, the report seeks to:

- Document the lived experiences of disabled individuals facing or at risk of energy poverty.
- Identify disability-specific comfort requirements, environmental needs and constraints.
- Examine daily routines, energy behaviours and coping strategies.
- Highlight technical, financial and structural barriers affecting energy use and autonomy.
- Identify cross-country similarities and differences.
- Translate these insights into actionable input for the ASSERT training, mentoring and policy components.

This report therefore acts as the evidence base that will guide the design of accessible training resources and shape future policy-oriented tools within the project.

1.3. Methodological Approach

Data collection was carried out using a shared methodological protocol, defined in the ASSERT Toolkit, which provides guidance for conducting focus groups, interviews and surveys with people with disabilities. The toolkit, which is provided as an appendix to this report, includes:

- Accessibility requirements (physical, sensory, cognitive, linguistic).
- Guidance on inclusive recruitment strategies.
- Standardised discussion templates covering comfort, energy practices, housing conditions and support needs.
- Instructions for running focus groups and interviews ethically and safely.
- GDPR (General Data Protection Regulation)-compliant consent and data-protection procedures.

Following this protocol, each national partner conducted **focus groups**, **semi-structured interviews**, or a combination of both, depending on local needs and participant accessibility, and a **standardised survey**. The three tools served complementary purposes:

- **Focus groups** explored shared experiences, perceptions, and challenges in a collective discussion setting.
- **Interviews** allowed for in-depth, individual accounts, especially for participants unable to join group sessions.
- The **survey** collected structured, comparable information on demographics, disability types, housing conditions, energy use and comfort needs, enabling cross-country quantitative insights.

Across the five pilot countries, a total of **47 participants took part in focus groups or interviews**. These participants **comprised people with disabilities who were able to participate directly**, as well as **family members, caregivers, and professionals** who contributed **as representatives of individuals who could not participate directly** due to the nature of severity of their disability. Further, the **survey was completed by 47 respondents**, including a limited number of individuals who **only completed the survey and did not participate in focus groups or interviews**

Proxy participation occurred primarily in cases involving severe cognitive, intellectual, psychosocial, or communication-related disabilities, as documented in the national pilot reports. In particular, in Cyprus, carers and professional staff from the SMILE autism support centre participated in interviews to report on the observed energy needs, comfort requirements, and environmental conditions of individuals on the autism spectrum, who are generally unable to articulate such perceptions directly. Similarly, in Spain, some contributions were mediated through family members or support organisations representing individuals with intellectual disabilities or minors.

It is to be noted that carers and professionals are not counted as persons with disabilities in the participant totals. Their inclusion as proxy informants follows the inclusive methodological framework defined in the ASSERT Toolkit and ensures that people with severe disabilities are not excluded from the analysis. The data represent adults with **physical, sensory, intellectual, cognitive and psychosocial disabilities**, either through **direct participation** or **proxy representation**

The discussions and survey responses covered a core set of topics common across all pilots: thermal comfort perception, indoor environmental experience, energy-use routines and practices, assistive device use, heating and cooling strategies, affordability constraints, transport and mobility, housing conditions, digital literacy, and awareness of support schemes.

This harmonised but flexible approach ensured methodological comparability while allowing partners to tailor the facilitation to their local disability communities, languages and accessibility needs.

1.4. Implementation of the Common Methodology across Pilot Countries

This subsection describes how the shared methodological framework defined in the ASSERT Toolkit was implemented across the five national pilots. All partners followed the same core protocol for recruitment, accessibility, data collection, and ethical procedures. However, the organisation of focus groups and interviews was adapted to local disability communities, institutional contexts, and accessibility requirements. Analytical findings related to climatic conditions, housing characteristics, and energy practices are presented in Section 2.

Table 1 provides an overview of how the common methodology was operationalised in each pilot country, including the data collection formats, participant profiles, and the main themes emerging from the qualitative activities.

Country	Region(s)	Data collection format	Participants*	Disability profiles represented	Key themes emerging
Cyprus	Nicosia, Sotira	1 focus group + 1 interview with professionals	Adults with disabilities; carers and professionals	Hearing impairments, mobility impairments (direct), autism (represented via professionals)	Heatwave vulnerability, financial strain, inaccessible infrastructure, lack of institutional support, safety and sensory needs
France	Multiple urban contexts	3 focus groups	Adults with disabilities	Neuromuscular disabilities, visual impairment, chronic illness	Extreme heat exposure, indoor discomfort, overheating risks, urban housing constraints
Greece	Athens and other urban areas	2 focus groups	Adults with disabilities	Physical disabilities (incl. quadriplegia), neurological conditions, reduced hearing, dysplasia	Constant thermal needs (~21–22 °C), shared heating systems, poor insulation, mobility-related energy use, high energy costs, inaccessible infrastructure, complex subsidy procedures
Italy	Trentino-Alto Adige, Lombardia	Semi-structured interviews	Adults with disabilities	Physical disabilities; chronic debilitating conditions	High electricity dependence, multisensory comfort needs, energy poverty, autonomy and accessibility constraints, design and technological limitations

Spain	Barcelona, Igualada	2 focus groups	Adults with intellectual disabilities; parents of children with functional diversity; one adult with physical disability	Intellectual disabilities, physical disabilities (direct), functional diversity (including children represented by parents)	Summer overheating, disability-related energy practices, additional economic burden, mediated energy decision-making, gaps in inclusive public policies

Table 1 Adaptation of the common ASSERT methodology across pilot countries

Together, the pilot implementations ensured inclusive coverage of diverse disability groups and living situations while maintaining methodological consistency across countries. The use of multiple qualitative formats (focus groups, interviews, and proxy participation) allowed partners to capture both shared patterns and context-specific challenges related to energy use, comfort, accessibility, and vulnerability. Across all pilots, disability-related energy needs were shaped by a combination of climatic exposure, housing quality, health conditions, mobility constraints, and the availability (or absence) of institutional support mechanisms.

2. Cross-Country Findings and Common Trends

2.1. Profile of Participants

Key takeaways
• Participants represent a wide range of disability types, ages, living arrangements and socio-economic situations across the five Southern European countries. • Disability-related needs intersect with housing, income and care arrangements, shaping daily energy use and vulnerability. • Proxy participation ensured inclusion of people unable to participate directly, without counting carers or professionals as participants.

Table 2 Key Takeaways (Section 2.1. Profile of Participants)

The cross-country sample reflects **substantial diversity in disability type, age, living arrangements and support needs**, providing a robust basis for analysing how energy poverty is experienced by people with disabilities across different national contexts. Participants included adults with physical, sensory, intellectual, cognitive and psychosocial disabilities, living independently, with family members, or with varying levels of formal or informal care support.

This diversity is analytically significant, as it reveals how disability-related needs interact with housing conditions, income constraints and care arrangements to shape everyday energy use. For many participants, long periods spent at home, reliance on assistive or medical devices, and the need for stable indoor environments were structural features of daily life rather than individual choices.

The participant profile therefore helps explain a core finding of this report: people with disabilities often have limited capacity to reduce energy consumption without compromising health, safety or autonomy. Energy demand is closely tied to essential daily functioning, care routines and accessibility requirements, emphasizing why standard energy-poverty mitigation strategies based on behavioural reduction are frequently inappropriate in disability contexts.

2.1.1 Socio-demographic Characteristics

Participants represented a wide age range, from young adults (18–30) to older adults above 70, while a portion of the dataset also includes minors represented by parents/carers. Age distributions varied by country sample. The majority were between 31–50 years, an age band where disability-related needs often intersect with financial pressures, caregiving responsibilities and increased time spent at home. Gender composition also varied across pilots. Women were slightly over-represented in several national samples, and in Spain four mothers participated on behalf of their children with functional diversity.

Across the dataset, education levels varied considerably (from primary education to university degrees) indicating that energy poverty and disability affect households across diverse socio-economic groups.

Employment situations ranged from full-time work to part-time, student life, remote work, unemployment and early retirement due to disability. Many participants, especially those with mobility impairments or chronic illnesses, spend 11–19 hours per day at home, **intensifying their dependence on domestic energy services for health, autonomy and daily activities.**

2.1.2 Disability Types and Health Conditions

The combined participant group reflected a broad spectrum of disability experiences spanning physical (mobility), sensory, intellectual, cognitive, psychosocial and chronic health conditions. Several individuals lived with multiple conditions simultaneously, increasing their vulnerability to poor indoor environments and energy insecurity.

Within this analysis, physical disabilities are discussed primarily in relation to mobility-related impairments, given their strong implications for time spent at home, reliance on assistive devices, and dependence on domestic energy services. Other disability types are presented as distinct but potentially overlapping categories, as they introduce additional energy-relevant needs related to communication, safety, sensory regulation and care routines that are not captured by a mobility-focused perspective alone. These categories are therefore not mutually exclusive: chronic illnesses may coexist with mobility impairments, and sensory or cognitive disabilities involve distinct communication, safety and support needs that are not captured by mobility-based classifications alone.

2.1.2.1 Physical Disabilities and Mobility Impairments (most common across countries)

Physical/ mobility-related impairments were the most frequently reported across the dataset. These included paraplegia and quadriplegia, neuromuscular and

degenerative diseases, mobility impairments requiring wheelchairs or scooters, circulatory and respiratory conditions, and chronic pain. Across countries, participants with physical impairments frequently required stable indoor temperatures, controlled humidity, and continuous access to electricity for medical, assistive, or mobility-related devices (including charging needs for mobility aids) . These requirements directly affect baseline household energy demand and limit the scope for reducing consumption without compromising health, safety, or autonomy.

While ASSERT primarily focuses on individuals with physical impairments, other disability types were deliberately included in this analysis where they intersect with or amplify energy-related vulnerability, comfort needs, and reliance on domestic energy services.

2.1.2.2 Sensory Disabilities

Sensory disabilities were also represented. Participants included people who are blind or visually impaired, as well as individuals who are deaf or hard-of-hearing. Sensory disabilities were especially represented in Cyprus, where 4 out of 5 focus group participants had hearing impairments. Their needs emphasise the importance of visual contrast, consistent lighting, vibration and light-based alerts for safety and communication, and accessible communication formats for receiving information and emergency notifications.

2.1.2.3 Intellectual, Cognitive and Psychosocial Disabilities

Intellectual and cognitive disabilities were primarily represented in the Spanish pilot, where adults with intellectual disabilities and parents of children with functional diversity participated. These contributions were included to reflect disability-specific energy practices that involve mediated decision-making, caregiving routines, and child- or support-related energy use).

The Cyprus SMILE interviews provided additional insights into autism-specific environmental needs, although these were a day-care and support-centre setting rather than private household cases. While not directly comparable to household cases, these insights highlighted neurodevelopmental-disability-specific requirements for controlled lighting, reduced noise, and adapted environments to enhance overall safety. Psychosocial conditions (e.g. chronic anxiety, migraine, sensory overload, behavioural challenges) were reported across countries.

2.1.2.4 Chronic Illnesses

Across all five countries, participants reported chronic and long-term illnesses, some of which coexist with physical or sensory impairments. These included sickle-cell anaemia, cardiovascular diseases, severe migraines, epilepsy, respiratory disorders, and chronic fatigue. These conditions significantly heighten vulnerability

to temperature extremes, humidity, mould, noise and poor air quality, increasing the need for reliable heating, cooling, and ventilation.

Overall, the sample captures all major disability categories (physical, sensory, intellectual, cognitive, psychosocial, chronic illness), and in many cases individuals experience multiple conditions, compounding vulnerability. This also demonstrated how intersecting conditions add to energy needs, making households with disabilities particularly vulnerable to inadequate indoor environments or unaffordable energy costs.

2.1.3 Living Arrangements and Housing Context

Living arrangements varied widely across the five pilot countries. Many participants lived with family members or partners, while others lived alone. A smaller number lived in supported, shared, or caregiver-assisted housing arrangements, particularly in Spain and Greece, where Non-Governmental Organisations (NGOs) assist adults with intellectual disabilities in semi-independent living arrangements.

Across all countries, participants predominantly lived in urban areas, with a notable share residing in suburban or peri-urban neighbourhoods, as reported in Cyprus (3 of 5 participants), parts of Greece (e.g., Petroupoli, Kilkis), and Spain (e.g., Igualada). A smaller proportion lived in provincial or semi-urban settings (e.g., Italian participants from Trentino Alto Adige).

Housing types were primarily apartments in multi-storey buildings, reflecting typical urban housing stock. These buildings were often constructed before 1980, as reported in Spain, and Cyprus, and supported by qualitative descriptions of older, inefficient buildings in France, Greece, and Spain. A smaller number of dwellings were built between 1980–2010, as reported particularly in Cyprus and Greece, and only isolated cases represented more recent construction (e.g., one Cypriot participant living in a 2008–2017 building). Detached houses were less common overall, though present in Cyprus, and parts of Greece, with only isolated cases reported in Spain.

Housing quality varied substantially. Some participants lived in homes with good insulation, double or triple glazing, and central heating, whereas many others reported air-leaking windows, old or inefficient heating systems, moisture or mould problems, and limited ventilation. High indoor temperatures during summer, sometimes reaching 35–40°C in top-floor or poorly insulated dwellings, were reported across multiple countries, particularly during heatwaves.

Tenure conditions (social housing, private rental, ownership) often restricted participants' ability to install air conditioning, ceiling fans or renewable energy

systems. Shared heating systems and inaccessible window mechanisms further limited indoor comfort control, especially for individuals with mobility impairments.

2.1.4 Income, Support and Financial Vulnerability

Income levels varied across the five countries, but financial pressure was a consistent theme. In Cyprus, for instance, income ranged from < €500 to €2,499 per month, with two participants below the minimum-wage threshold. In Greece, many participants fall into a structural 'eligibility gap': incomes were too high to qualify for certain subsidies but still too low to cover the high energy costs associated with disability, particularly for cooling, heating, or powering essential medical equipment. Whereas, in France, participants highlighted that disability-related energy needs (e.g., medical equipment and medically required comfort) are poorly recognised in support schemes, with only limited reimbursement reported.

Across the pilots, several participants received disability allowances, carer support or social tariffs, but **these benefits rarely compensated for the additional and recurring costs of disability.** These include maintaining stable indoor temperatures, running medical and assistive devices that require continuous power, charging mobility aids, conducting frequent laundry (especially in households of people with intellectual or functional disabilities), covering higher transport costs, or affording larger or more adapted dwellings.

Participants often reported administrative barriers, unclear eligibility criteria and limited awareness of available support measures. These obstacles frequently excluded them from schemes despite clear need or limited their ability to successfully apply even when programmes formally existed. As a result, many households described a **chronic sense of financial precarity, reduced flexibility to manage rising energy bills, and very limited capacity to invest in energy efficiency measures or adaptive technologies that could improve comfort and reduce long-term costs.**

2.2. Understanding Energy Use at Home

Key takeaways
• Household energy use is primarily driven by disability-related needs, housing characteristics and affordability constraints rather than discretionary consumption.

- Electricity is the dominant energy carrier, supporting both everyday domestic functions and essential assistive or medical devices.
- Energy use and control are strongly influenced by housing conditions, accessibility of technical systems, and social arrangements within households.
- Limited autonomy over heating, cooling and appliances is common, particularly in shared or inaccessible housing contexts.

Table 3 Key Takeaways (Section 2.2. Understanding Energy Use at Home)

Energy use across the participating households is shaped by disability-related needs, housing characteristics, affordability constraints and levels of autonomy in managing daily routines. The disability-related energy needs in this context, refer to non-discretionary energy uses linked to health, mobility, care, and safety requirements, such as powering medical or assistive devices, charging mobility aids, maintaining medically appropriate indoor temperatures, and supporting care-related household routines. Across countries, common patterns persist. Electricity is the main energy carrier; heating and cooling practices depend strongly on affordability and building constraints; and energy-related decisions are often shared within families or mediated by caregivers. **Participants' understanding of energy consumption is generally limited, with varying levels of digital and energy literacy, which further influences their ability to manage costs and maintain comfort.**

2.2.1 Main Energy Sources and Household Energy Systems

Across all five pilots, **electricity emerged as the main energy carrier in everyday life**. It powers essential domestic appliances, lighting, in many cases, space heating or cooling, as well as many assistive devices. This **reliance on electricity was particularly notable among participants with mobility impairments, chronic illnesses or sensory disabilities, for whom maintaining stable temperatures is necessary, continuous power supply is fundamental for operating medical equipment, charging wheelchairs and ensuring safe navigation within the home.** In several countries, participants explicitly identified electricity as their largest energy expense, especially in summer when cooling needs are highest.

Heating is provided through a mix of centralised and individual systems. In many older multi-storey apartment buildings (notably in Greece, Spain, France and Italy), heating is supplied by central systems that operate only at fixed times set by building managers or co-owners. These systems often provided limited flexibility and insufficient warmth, especially for participants with higher or medically

required temperature needs. Where central heating is unavailable, insufficient, or too expensive, participants rely on individual solutions such as electric heaters, heat pumps, split units, or portable devices. The personal heating devices, in such cases, would include rechargeable electric shawl, hand warmers, or adding extra layers of clothing, as seen in the case of Italian pilot. In Cyprus, households also reported significant use of heating oil, firewood and Liquefied Petroleum Gas (LPG) for winter heating alongside electricity. Whereas, in Greece, some participants mentioned using biomass for heating.

Cooling is a critical and recurring need across all pilots, particularly given increasingly frequent heatwaves. Most participants reported using air conditioning and/or fans to maintain tolerable indoor temperatures in summer, but many restrict their use because of high electricity costs, technical constraints, and housing regulations. In several cases, participants described indoor temperatures reaching 35-40 °C during heatwaves (explicitly reported in France and Spain), with similarly severe overheating also described in other pilots, with fans becoming ineffective and air conditioning either unaffordable or technically difficult to install (for example, due to building design, lack of suitable connection points, false ceilings, or restrictions imposed by building management or urban regulations).

Domestic hot water is commonly produced with electricity or gas, with some households benefiting from solar water heaters. In Cyprus, solar thermal systems for hot water were widely reported, and in Spain a small number of participants mentioned heat pumps as part of more efficient home systems. However, these technologies remain the exception rather than the norm.

Renewable energy and energy-efficiency technologies are present but rarely accessible at the individual household level. In Spain, for instance, one DPO (Disabled People's Organisation) installed LED lighting in supported houses, but apart from one concrete case, individual apartments had not installed LED lighting. In Cyprus, one participant reported having photovoltaic panels at home, while the SMILE autism centre described an offer to install photovoltaic (PV) panel that was delayed due to administrative and property constraints. In France, participants expressed interest in options such as pellets or solar PV but pointed to high upfront costs, lack of tailored support and technical complexity as key obstacles. In Italy, none of the interviewed households reported using renewable energy systems; participants described limited knowledge of technologies such as photovoltaics or heat pumps and pointed to practical constraints, including unsuitable balconies and unfavourable cost–benefit considerations. On the other hand, in Greece, while the use of renewable sources such as solar thermal systems for domestic hot water and biomass for space heating was reported, there was no evidence of household-level adoption of newer renewable or energy-efficiency technologies such as photovoltaics, heat pumps or efficiency retrofits.

These findings indicate that the energy systems on which participants depend are characterised by high reliance on electricity, mixed and often ageing heating infrastructures, growing cooling needs, and very limited access to individually controlled renewable solutions. This configuration creates a trade-off situation: many of the devices and systems that are essential for comfort, mobility and health are also those that drive the highest energy costs.

2.2.2 Household Energy Decision-Making and Autonomy

Across the pilots, participant's autonomy over heating, cooling, and appliance use depended strongly on their living arrangements, the physical accessibility of household systems, and whether energy-related decisions were shared with family members, caregivers, or support staff.

Participants living alone, particularly in France and in some cases of Italy, generally made their own decisions regarding heating, cooling and appliance use. However, autonomy did not imply control. Many lived in older apartment buildings with collective heating systems operating on fixed schedules, or with building regulations that limited the installation of air conditioning.

In Cyprus, Greece, Italy, and Spain, most participants lived with family members. There were a few cases in France too where such living arrangements existed. Decisions about heating, cooling and appliance use were typically shared, and in many cases driven by the primary caregiver or household head. For minors with functional diversity in Spain, parents determined most aspects of daily energy management, including laundry routines, lighting use and temperature control. Similarly, adults with intellectual disabilities in Greece and Spain relied on family or support staff to manage heating, cooling and appliances.

Supported living arrangements in Spain and Greece introduced a different pattern of shared responsibility. NGO staff or support workers helped residents manage daily routines, including ventilation, appliance use or safety-related tasks. Energy decisions were therefore partially mediated by organisational rules, staff availability or building constraints rather than individual preference.

Participants in institutional contexts (e.g., Cyprus SMILE) provided insight into how environmental controls in non-domestic settings, such as lighting, noise levels and room temperatures, are determined by facility staff, often with limited user input. Although not directly reflective of private homes, these cases highlight how autonomy can be highly variable depending on living arrangements.

Across the pilots, participants with severe mobility impairments, visual impairments or chronic illnesses described reliance on caregivers for energy-related tasks such as opening and closing windows, adjusting thermostats,

managing air conditioning or operating appliances. **Physical inaccessibility of switches, window handles, or heating controls was a significant barrier.** This dependence contributed to feelings of reduced autonomy and also limited real-time thermal adjustment, particularly during heatwaves.

2.2.3 Lived Energy Expenditure and Affordability Constraints

Across all five pilot countries, participants described **electricity as one of their most significant household expenses, particularly in homes with high cooling needs or multiple energy-dependent devices.** Electricity powered not only lighting, refrigeration and cooking appliances, but also mobility aids, medical equipment, sensory-adapted devices and, in many cases, space cooling and heating. Households across piloting countries consistently reported that summer electricity bills increased sharply due to the need for air conditioning during heatwaves, even though many participants restricted AC (air-conditioner) use because it was unaffordable.

In Cyprus, even moderate electricity bills represented a substantial share of disposable income. In France and Greece, high temperatures during extended heatwaves dramatically drove up electricity costs, often forcing participants to keep indoor temperatures higher than medically advisable. In Italy, no specific estimation of energy bills was provided, but participants reported confusion and frustration regarding the complexity and lack of transparency in energy bills. One participant mentions that for at least one or two years, they could not afford to use the heating because condominium bills were extremely high. Another participant describes how they opted for a fixed monthly payment plan to avoid unexpected and unaffordable winter bills, accepting slightly higher summer costs in exchange for stability throughout the year.

Seasonal variation was a defining feature of affordability patterns. Summer was consistently identified as the most expensive and challenging season, as participants struggled to maintain safe indoor temperatures during heatwaves. French participants described midday periods (approximately 11 a.m. to 4 p.m.) during which indoor conditions were “unbearable” without air conditioning, yet operating costs prevented many from using AC continuously. **In winter, affordability challenges emerged in different ways: older, poorly insulated buildings, limited central heating schedules, or outdated systems frequently forced households to rely on supplementary electric heaters, which further increased energy use and costs.** Participants living in top-floor apartments, older building stock or homes with moisture and mould were especially likely to experience high winter heating needs.

Participants across all countries reported disability-specific reasons for elevated energy expenditure. These included the need for continuous charging of mobility aids such as electric wheelchairs and scooters, the operation of medical devices requiring stable and uninterrupted power supply (e.g., respiratory equipment, sleep machines, monitoring devices), the need for stable temperatures to avoid pain, spasms, circulatory problems or medical complications, additional lighting requirements for visually impaired individuals, and frequent laundry use, particularly in households with intellectual or cognitive disabilities where incontinence, sensory behaviours or daily support routines increased washing frequency. These patterns were documented across pilots, demonstrating clear links between disability and increased baseline energy needs.

Affordability challenges were also associated with behavioural adaptations and coping mechanisms. Participants described reducing appliance use, delaying cooling or heating, limiting heating to only one or two rooms, postponing showers, or using fans even when they were insufficient during severe heatwaves. Anxiety around bill payment, fear of power outages, especially among participants dependent on medical or mobility devices, and the administrative burden of applying for subsidies were recurring concerns across several countries. In France and Greece, participants reported worrying about whether they could afford essential cooling. In Cyprus, some participants had previously delayed bill payments, while others expressed concern that grants or allowances did not match their actual needs. Administrative complexity, unclear eligibility rules and limited awareness of available support further intensified financial stress and restricted participants' ability to invest in energy-efficiency upgrades or adaptive technologies that could reduce long-term costs.

2.2.4 Awareness and Understanding of Energy Use

Awareness and understanding of energy use varied widely across participants, but several common patterns emerged across all five pilot countries. Participants were generally aware of the need to manage energy consumption and actively attempted to reduce use where possible, particularly in response to affordability pressures. Common strategies included limiting the use of air conditioning or heating, switching off appliances, restricting energy use to specific rooms or times of day, and relying on fans or natural ventilation even when comfort was compromised. However, these efforts were often constrained by disability-related health needs, housing conditions, and limited control over building systems, reducing participants' ability to act on their awareness without negative consequences for comfort or well-being.

At the same time, many households reported limited knowledge of how appliances contributed to overall consumption, how tariff structures worked, or how to interpret electricity and heating bills. In Italy and France, many participants explicitly described difficulties understanding bill breakdowns, confusing tariff categories, and non-transparent cost components. In Spain, some adults with intellectual disabilities had limited or no direct contact with billing information, needing support for financial management in some cases.

Use of digital and smart energy technologies was uneven across the pilots. In Italy, participants expressed a wide range of attitudes towards domotics and smart-home technologies. Some reported positive experiences or interest in automation for improving independence, safety and comfort, while others expressed caution related to reliability, privacy or technological familiarity. In Cyprus and Spain, at least one participant reported using smart thermostats or timers, while others described manual strategies to manage consumption. In France, participants showed interest in home automation or digital monitoring systems, recognising their potential benefits for independence and comfort, however, the high cost of such technologies and limited accessibility features prevented widespread adoption. However, in other cases, majorly in other cases of Cyprus, Greece, and Spain, digital energy technologies were either unfamiliar, inaccessible, or not integrated into their daily routines. There was also an expression of distrust in smart technologies or finding apps and interfaces difficult to navigate.

Energy-related misconceptions and literacy gaps were also common. Participants frequently reported uncertainty about which appliances used the most energy, how heating or cooling controls operated, or how to reduce consumption without compromising health and comfort. In Cyprus, participants highlighted that online information systems for energy grants or billing were excessively complex or lacked accessible design features such as captioning or visual cues, making it difficult to understand or access support. Similarly, in Greece, the lack of clear guidance and the complexity of online procedures were identified as significant barriers to understanding available subsidies and energy-saving measures. These difficulties were further compounded by limited digital literacy and restricted access to information centres, which were often exacerbated by mobility limitations or other accessibility barriers. As a result, individuals already in vulnerable situations faced additional exclusion simply because they could not navigate digital systems or physically reach the services intended to support them.

Across the dataset, participants repeatedly asked for clearer and more accessible information. Several groups expressed a preference for step-by-step visual guides, video tutorials with captions or sign language, easy-read formats for people with cognitive disabilities, and simple explanations of bills and appliance consumption. These requests highlight that inclusive, user-friendly educational materials are

essential for enabling safe and informed energy management among households with disabilities.

2.2.5 Housing Conditions and Technical Barriers Shaping Energy Use

The building architecture and the technical systems installed play a pivotal role in shaping the daily comfort, autonomy, and energy needs of people with disabilities. Across the study sample, participants' living situations reflect a broad spectrum of housing types, technical standards, and accessibility features, highlighting the interplay between building features, accessibility, and the crucial support provided by caregivers in regulating indoor conditions.

2.2.5.1. Type and Condition of Housing Envelope

The participants in this study predominantly reside in apartments within multi-residential buildings, with dwelling size varying substantially by country. In Spain, most apartments were reported as relatively small (often 30–59 m^2), while Greece reported a broader range (30–149 m^2, with one case above 150 m^2) and Cyprus reported homes ranging from 60–89 m^2 to over 150 m^2 (including detached houses). Comparable quantitative information on dwelling size was not systematically reported in the Italian and French pilot reports.

Across countries, housing envelopes quality and technical systems varied widely, reflecting both building age and climatic context. Participants reported conditions which span from poorly insulated homes with air leaking window frames and inefficient heating systems to good, insulated homes with double or triple glazing. Visible mould and moisture problems are often reported in the poorly insulated home cases.

2.2.5.2. Control Systems and Accessibility

In various homes, specific physical barriers significantly hinder comfort and accessibility to indoor conditions control for residents:

- Windows that are difficult for people in wheelchairs to reach, making it hard for them to ventilate the rooms.
- Presence of grilles or special closures on windows designed for children safety. While these grilles serve an important purpose, they often obstruct the ability to open windows, thereby restricting fresh air circulation.
- Limited or Lack of room temperature control possibility
- **Central heating systems operate only during set hours and are co-managed at building level, severely limiting individual control over indoor comfort.**

- **Impossibility to install air conditioning due to urban planning regulations or physical limitations (lack of space, lack of connection points or building design)**

At the same time, some participants from the Italian pilot, and at least one participant each from Cyprus and Spain, highlight that home automation (domotics) can partially offset accessibility barriers (e.g., smart lighting, automated blinds, smart thermostats, app-controlled AC), improving control and autonomy, though this is not uniformly available across households.

2.2.5.3. Structural or Tenure Barriers (e.g., renters unable to modify homes).

Renters and residents in shared buildings face restrictions on installing air conditioning or solar panels due to community rules, shared building governance or lack of permission. Most homes lack adaptations for energy efficiency or accessibility beyond a few modified bathrooms. Tenure conditions, shared systems and building regulations often prevent necessary modifications for comfort and energy efficiency

Financial barriers, combined with regulatory complexity and building characteristics (e.g. unsuitable layouts), prevent the adoption of renewable energy solutions and home automation, even though some participants, particularly in Italy, reported having adopted limited forms of home automation where building conditions and resources allowed.

Public policies and aid schemes often do not adequately recognise the specific energy needs of people with disabilities, leaving many households without sufficient support.

2.3. Appliances and Assistive Energy Needs

Key takeaways
• Energy demand reflects a combination of standard household appliances and disability-specific assistive, medical and communication devices. • Many electricity uses are essential and cannot be reduced without compromising health, safety or autonomy. • Awareness of the energy impact of assistive devices is largely qualitative, with no reported use of monitoring tools specifically to track assistive/medical device consumption

Table 4 Key Takeaways (Section 2.3. Appliances and Assistive Energy Needs)

Participants across all five pilots relied on a combination of everyday household appliances and disability-specific devices that together shaped their energy demand. While many of these uses are common to most households (e.g. cooking, laundry, cooling), others are directly linked to disability, health, communication and safety needs, and therefore non-negotiable. This section distinguishes between general appliances and assistive/medical equipment and highlights how aware participants were of the associated energy consumption.

2.3.1 Household Appliances and Everyday Loads

Across all the piloting countries, participants described using a typical set of domestic appliances, which form the baseline of household electricity and fuel demand:

- Cooking and food storage: Participants in Spain reported routine use of common cooking appliances (gas or electric stove, oven, microwave). In Cyprus, three out of five participants reported using cooking appliances, suggesting that some participants may not cook themselves or depend on others for meals. Refrigerators/freezers were part of typical household appliance use across pilots.
- Laundry: Washing machines were used regularly in all pilots. In Spain, carers of children and adults with intellectual disabilities reported doing one or two loads of laundry per day because of incontinence, limited fine motor control affecting self-care tasks, and other disability-related issues, increasing both water and electricity consumption.
- Cooling and heating devices: Almost all participants reported using air conditioning and/or fans in summer, and various forms of heating in winter (central heating, portable electric heaters, heat pumps, or other fuels such as heating oil, LPG and firewood in Cyprus and parts of Spain and Greece). High summer temperatures (up to 35–40 °C indoors in some Spanish homes) meant that cooling was not a luxury but a necessity, even when participants tried to limit use because of cost.
- Dehumidification and moisture control: In Greece and Italy, at least one participant used a dehumidifier due to humidity and dampness in a poorly performing building, adding another continuous electric load.
- Lighting: Participants commonly used energy-efficient bulbs (LEDs) where available (explicitly reported in Cyprus and Spain), but patterns varied. In

Spain, some people with intellectual disability, or children with disability need the lights to be left on due to fear of the dark, anxiety or sensory regulation needs, which increases consumption compared to 'typical' households.

- Entertainment and communication devices: Televisions, laptops, tablets, smartphones and internet routers were commonly used across all pilots. While not disability-specific, these devices support daily routines, access to information, communication and social participation, particularly for participants who spend extended periods at home. Their cumulative electricity use contributes to baseline demand, especially where devices are used for long hours each day.

These everyday appliances are not disability-specific, but the frequency and intensity of use are clearly shaped by disability and time spent at home (often 11–19 hours per day for many participants).

2.3.2 Assistive, Medical and Communication Devices

Beyond standard household appliances, participants described a range of assistive and medical devices that require continuous or repeated electricity use. These devices are directly linked to survival, health, mobility, safety, and communication, and therefore cannot be reduced without serious consequences.

From the country reports and cross-country synthesis, the following categories emerged:

2.3.2.1 Mobility Aids

- Wheelchair use was specified explicitly in the cases of Cyprus and Spain.
- Powered mobility aids, including electric wheelchairs (France and Italy) and mobility scooters - especially designed for people who lack the ability to operate manual wheelchair (e.g., due to quadriplegia) - (Greece) were explicitly mentioned.
- In Greece, one participant reported using two types of scooters depending on travel distance and noted that frequent charging significantly increased electricity bills.
- Across the pilots, participants relying on powered mobility aids described themselves as dependent on electricity and highlighted the risk posed by power cuts.

2.3.2.2 Medical and Health-related Equipment

- The cross-country synthesis highlighted several participants who depend on respiratory medical equipment, sleep machines, or other electrically powered health devices at home. One participant from France stated: "I am completely dependent on electricity. If there's a power outage tomorrow, my only option is to go to the hospital." This clearly links electricity to life-supporting functions rather than comfort alone. It should also be noted that in the event of a power outage, participants dependent on powered mobility aids or medical equipment would be unable to respond safely to blackouts or other emergency situations, including evacuating buildings without the use of elevators, further increasing health and safety risks.
- In Spain, additionally, a participant mentioned the need of a sleep machine used at night for individuals with sleep disorders, adding to baseline nighttime electricity use.

2.3.2.3 Hearing and Communication Devices

- In Cyprus, where 4 out of 5 focus group participants had hearing impairments, the discussion focused on visual and vibration-based devices needed to replace sound-based cues. Examples included doorbells and alert systems based on light or vibration rather than sound.
- Participants noted that many standard products (e.g. smoke detectors, baby monitors, household devices) rely solely on sound, forcing them to search for specialised alternatives.
- The Cypriot group also emphasised the importance of phones, tablets, computers and printers for communication within the Deaf community and with institutions, especially when written or visual channels are the only accessible option.

2.3.2.4 Safety and Sensory-related Devices

- One Cypriot participant with no sense of smell described relying on sensors or design choices (e.g. preferring electric stoves over LPG-fuelled gas stoves to avoid undetected gas leaks), illustrating how safety-motivated equipment choices also shape energy profiles.
- At the SMILE autism centre in Cyprus, staff described a sensory and de-escalation room equipped with a sophisticated light and sound projection system and soundproofing. While this is an institutional case rather than a household, it shows how autism-specific support environments can be technologically intensive and energy-demanding.

In all these cases, the additional electricity demand is disability driven. These devices are required to move, breathe, sleep safely, communicate, or self-regulate, not to increase comfort in a discretionary sense.

2.3.3 Awareness of the Energy Consumption of Assistive Equipment

Participants were generally aware that assistive and medical devices increased their energy bills, but they rarely had precise information about how much these devices consumed:

- In Greece, the scooter user explicitly linked higher electricity bills to the need for frequent charging, recognising it as a major cost driver.
- In Spain, participants understood that daily sleep machine use and frequent laundry significantly raised consumption but did not quantify it.
- Across the pilots, electricity dependent participants emphasised the critical importance of continuous power for medical devices (such as respiratory masks at night and a CoughAssist device) and wheelchairs, focusing more on risk and survival than on kilowatt-hours or tariffs.
- In Cyprus, participants recognised that the combination of ACs for health-related comfort, energy-intensive medical equipment, and digital communication tools pushed electricity bills to levels that were often unaffordable, especially for those with low incomes. However, they did not typically use tools such as smart meters or appliance-specific monitors to track those impacts.

Across all pilots, and consistent with findings reported earlier, no participants reported using appliance-level or device-specific real-time monitoring tools specifically to track the consumption of medical or assistive devices. Instead, awareness was mostly qualitative and experience-based ("this device is expensive to run", "bills increased after we got the scooter/sleep machine"), rather than based on measured data.

This pattern stresses a crucial point for later training and policy work: For many households with disabilities, a significant share of their energy use is non-reducible, because it is tied to essential assistive and medical equipment. What they often lack is not willingness to save energy, but accessible information and structural support to manage these unavoidable loads more efficiently (e.g. appropriate tariffs, targeted subsidies, or technical/administrative guidance), without compromising health, safety or autonomy.

2.4. Comfort Expectations and Thermal Experience

Key takeaways
• Thermal comfort is a central concern across all pilots, shaped by Mediterranean climatic exposure and housing quality. • Participants report narrow, often medically required comfort ranges and widespread exposure to summer overheating. • Coping strategies exist but are frequently insufficient during extreme weather conditions.

Table 5 Key Takeaways (Section 2.4. Comfort Expectations and Thermal Experience)

Thermal comfort emerged as one of the strongest cross-cutting themes across all five pilot countries. While all pilots are located in Southern Europe, they span distinct climatic contexts, including Mediterranean climates as well as northern Italian regions influenced by Alpine conditions, which shape different seasonal comfort challenges. Participants described a combination of preferred indoor temperature ranges, recurring patterns of discomfort linked to extreme heat, cold, humidity and air quality, and a series of coping strategies shaped by disability, building quality, and the affordability of energy. For many participants, particularly those with mobility impairments, chronic illnesses, or sensory sensitivities, thermal comfort was directly tied to health, functioning and safety, rather than personal preference. As such, **most households could not reduce heating or cooling without compromising well-being.**

2.4.1 Reported Comfort Ranges and Preferred Indoor Temperatures

Across the pilots, participants consistently reported **narrow comfort temperature ranges, often centred around 21–22°C for winter conditions.** This was especially true for individuals with physical disabilities, chronic pain, neuromuscular conditions or circulatory problems, who described this temperature band **as medically necessary rather than simply comfortable**. Several participants explained that feeling cold, even when indoor temperatures were still 'normal' for others, could trigger numbness, pain, spasms, or a general deterioration of their condition.

In summer, preferred comfort levels varied more widely, in part, not because needs were lower, but because many participants felt **they 'endured' heat rather than achieved comfort**. Most participants reported that indoor temperatures, especially during heatwaves, became intolerable or unsafe, especially for those with heat-sensitive neurological or chronic conditions. In Spain, Greece, Cyprus, and

parts of France, participants reported experiencing indoor temperatures of 35-40°C during heatwaves, particularly in top-floor or poorly insulated dwellings, making normal functioning extremely difficult even with fans or intermittent air conditioning.

Participants with sensory disabilities (e.g. blind or visually impaired, deaf or hard-of-hearing) did not report disability-specific comfort temperatures, reflecting that their thermal needs were more influenced by dwelling characteristics and energy affordability than disability-specific physiological requirements.

2.4.2 Thermal Discomfort Patterns: Heat, Cold, Humidity and Air Quality

2.4.2.1 Heat Stress and Summer Discomfort

Heatwaves were consistently identified as the most challenging thermal condition across all pilot countries, reflecting the shared exposure of the Mediterranean and Southern European regions included in the study. Participants reported:

- inability to cool homes between late morning and early afternoon (11:00–16:00)
- dependence on AC for basic functioning, but inability to use it continuously due to cost
- fans becoming ineffective once indoor temperatures approached outdoor extremes

2.4.2.2 Winter Cold

Winter discomfort was noted but generally perceived as less severe than summer heat. Participants in Cyprus, Greece, Italy, and parts of Spain identified poor insulation, single-glazed windows or fixed central heating schedules as key barriers to maintaining adequate warmth. Some households in France, heated homes only to 15-16 °C due to cost, relying on additional clothing or small electric heaters. Those with mobility impairments or chronic pain often needed warmer indoor temperatures and experienced cold-related pain, stiffness, or numbness when heating was insufficient.

2.4.2.3 Humidity, Dryness and Poor Air Quality

Humidity, mould/ condensation, and air quality problems were highlighted across Cyprus, France, Greece, Italy, and Spain. Participants identified:

- mould, moisture and rot, especially in older buildings
- dry air causing bronchial irritation, particularly for those with respiratory conditions

- humidity causing migraines, nausea, vomiting or general malaise
- difficulty ventilating due to inaccessible windows or security grilles

In Cyprus, dust storms (Sahara dust) and pollution episodes added to the burden of poor indoor air quality, especially for people unable to ventilate safely.

The findings above show that thermal comfort for people with disabilities is defined by narrow, often medically required thresholds, and is strongly shaped by housing quality, climate exposure, and energy affordability. Across all pilots, participants experienced recurrent and sometimes severe thermal discomfort, particularly during summer heatwaves, but also during winter cold and periods of high humidity or poor air quality. These conditions were consistently described as affecting health, safety, and daily functioning rather than subjective comfort. While participants reported various ways of responding to these challenges, their capacity to maintain adequate indoor conditions was frequently constrained by structural, financial, and accessibility barriers. The behavioural responses and coping strategies adopted to manage these thermal challenges are examined in detail later in Section 2.6.

2.5. Implications of Energy Poverty on Health, Comfort, and Well-being of People with Disabilities

Key takeaways
• Indoor energy conditions are directly linked to physical health, emotional well-being and personal autonomy. • Inadequate heating, cooling, ventilation or electricity supply contributes to pain, fatigue, anxiety and heightened health risks. • Energy access is frequently described as essential for survival rather than discretionary comfort.

Table 6 Key Takeaways (Section 2.5. Health, Comfort, and Well-being)

Building on the thermal experiences described in Section 2.4, participants consistently reported that inadequate indoor environments had direct consequences for both physical and emotional well-being. Thermal conditions were not perceived as a matter of preference but as a determinant of health, autonomy and safety, particularly for people with disabilities or chronic conditions.

2.5.1 How Participants relate Energy conditions to Health Outcomes.

Across all countries the participants with physical disabilities repeatedly emphasised that thermal comfort is directly tied to their health and well-being. **Participants reported that maintaining a stable indoor temperature (around 21–22°C) is not just a comfort preference but a medical necessity.** Inadequate heating or cooling led to pain, numbness, spasms, circulatory problems or worsening of existing conditions.

Chronic illnesses and neurological conditions increased sensitivity to temperature extremes. Dry air irritated bronchial tubes, while high humidity exacerbated pain, migraines and nausea. Some participants depended on air conditioning for health-related reasons, including managing itching, inflammation or medical care routines.

. Poor air quality, mould and dust were cited as contributors to respiratory symptoms and general malaise.

2.5.2 Reported Physical and Emotional Impacts (cold-related pain, anxiety, social isolation).

Participants reported both physical and emotional impacts as a result of their energy poverty and indoor conditions.

Physical impacts refer to the tangible health consequences participants experience due to inadequate indoor environments and energy poverty. These include:

Heat-related symptoms:

- Irritability and general malaise
- Aggravation of menopausal symptoms (dry eyes, throat)
- Sleep disruption and exhaustion
- extreme fatigue and in one case near-vegetative state
- Exacerbation of chronic conditions
- Skin irritation and itching

Cold-related symptoms:

- Numb fingers when indoor temperatures are too low
- Pain and discomfort for immobile participants during cold spells
- Aggravation of chronic conditions

Humidity-related symptoms

- Migraines, nausea, and vomiting linked to rot and humidity
- Pain for chronic illness sufferers when humidity levels rise
- bronchial irritation and congestion due to dry air
- Aggravation of respiratory issues when humidity levels are low

Emotional impacts refer to the psychological stress of the participants as a result of energy poverty and their energy conditions. These are mainly reported as:

- **Anxiety and stress:** The high cost of energy and the inability to use necessary appliances (like AC) due to financial constraints led to anxiety and stress. There was also concern about safety, especially for those unable to perceive smells (e.g., risk of fire or gas leaks) and sounds (leading to lights being left on during night because of the fear of darkness). The rising cost of energy forces difficult choices between essential needs. Anxiety is heightened by the risk of power outages, unaffordable bills, and the lack of tailored support.
- **Social isolation:** Social isolation was mainly reported as a consequence of mobility barriers (due to inaccessible public transport) and lack of accessible employment. These led participants to stay home more often, increasing both energy use and feelings of isolation. Complex administrative procedures, lack of accessible housing and insufficient support can foster feelings of exclusion and frustration, compounding the emotional burden of energy poverty. These isolation feelings are exacerbated during heatwaves or cold spells, when some participants are forced to stay home to prevent health issues. While few participants experienced positive neighbourly support, others faced restrictive community rules that limited autonomy and increased isolation. Participants feel excluded from public policy and support schemes. Many are unaware of their rights or available aid, and social workers are often not trained to help with energy-related needs. This leads to frustration and a sense of neglect.
- **Loss of Autonomy:** The absence of accessible design (e.g., non-ergonomic appliances, inaccessible switches), the inability to access support services remotely (e.g. emergency call-in elevator) or to move freely due to infrastructure barriers undermines participants' autonomy and increased dependence on others.

These physical and emotional impacts demonstrate that inadequate energy access directly undermines health, autonomy, and well-being of people with disabilities whose comfort needs are medically and functionally determined.

2.5.3 Seasonality of Health Symptoms (winter cold, summer overheating)

Participants across all focus groups reported that health and comfort issues were strongly linked to energy conditions, with the most severe problems occurring during summer heatwaves. Heat stress was highlighted as a major health risk, particularly for those with disabilities or chronic illnesses, sometimes causing extreme fatigue and near-vegetative states. Winter cold was less frequently mentioned but still significant, especially in older, poorly insulated buildings where central heating was insufficient, leading to pain, numbness, and reliance on costly electric heaters. Occasional humidity and dryness issues contributed to respiratory irritation, migraines, and discomfort, while poor air quality and pollution increased vulnerability. The need for stable indoor temperatures and continuous power for medical devices means participants face year-round health risks, though the higher perceived discomfort in summer may partly reflect that the focus groups were conducted during the summer months.

2.6. Behavioural Actions and Energy Practices

Key takeaways
• Daily energy practices are structured around care routines, time spent at home and accessibility constraints. • Participants actively attempt to reduce energy use, but many practices remain unavoidable due to disability-related needs. • Structural, financial and technical barriers significantly limit further reductions in consumption.

Table 7 Key Takeaways (Section 2.6. Behavioural Actions and Energy Practices)

This section examines how daily routines, household management practices and behavioural adaptations shape energy use among participants. Previous sections focused on comfort thresholds and health impacts (Sections 2.4 and 2.5), however, this section analyses how energy is actually used and managed in everyday life, including the coping strategies participants adopt to maintain tolerable conditions while responding to affordability constraints.

Energy practices among participants are not simply a matter of individual choice. They are shaped by caregiving arrangements, accessibility constraints, housing

characteristics, financial pressure and institutional or technical barriers. As a result, many practices that increase energy use are not discretionary but **embedded in daily routines necessary for autonomy, safety and care**, even when households try to limit consumption.

2.6.1 Everyday Practices Influencing Energy Consumption and Comfort

Table 8 summarises the main everyday practices reported by participants that directly influence household energy consumption across the five pilot countries. These practices reflect baseline patterns of use, not comfort needs or health effects, and help explain why energy demand remains high even when households attempt to limit consumption.

Time spent at home	**Daily hours spent at home ranged from less than six hours for participants working outside the home, to 7–10 hours for younger adults, and up to 11–19 hours for older adults, people working from home or individuals with limited mobility. Longer time spent at home translated directly into higher baseline energy use for lighting, appliances, heating and cooling.**
Air conditioning and fans	AC use was limited due to cost, with reliance on fans even when ineffective during heatwaves. Accessibility constraints often required longer operation times.
Heating	Heating was often constrained by shared systems or cost. Some households limited temperatures to 15–16°C; others relied on supplementary heaters due to reduced mobility or compensation through clothing or blankets due to affordability.
Lighting	Lighting was essential for visual access and communication. In some households involving intellectual or cognitive disabilities, lights were kept on at night due to fear or sensory needs.
House appliances	Frequent use of cooking appliances, fans, AC units, local heaters, smartphones, tablets, or laptops reflected long daily occupancy rather than discretionary consumption.
Laundry routines	Laundry frequency was higher in households involving intellectual or cognitive disabilities due to incontinence, reduced fine motor control or care routines.
Medical devices and assistance equipment	Continuous charging of medical devices, mobility aids and communication equipment created non-flexible baseline loads.

Table 8 Everyday practices shaping household energy use among participants

This overview illustrates that energy consumption is embedded in care routines, accessibility needs and household organisation, rather than driven by excessive or wasteful behaviour.

2.6.2 Coping Strategies to Manage Comfort and Reduce Costs

Participants described a range of coping strategies used to manage indoor discomfort and/or reduce energy costs, though many acknowledged that these adaptations were insufficient during severe weather.

2.6.2.1 Heating and Cooling Adjustments

Participants reported adjusting heating and cooling use to balance comfort and affordability, including:

- limiting air conditioning to specific hours (often evening or night)
- relying on ceiling or standing fans rather than AC to reduce costs
- heating only one room in winter
- wearing extra clothing indoors
- showering multiple times during extreme heat for temporary relief
- use of smart thermostats/ timers (in a few cases)

In several countries, participants actively avoided using AC even during dangerous heatwaves due to electricity costs, resulting in prolonged exposure to high temperatures.

2.6.2.2 Ventilation and Window Management

Many participants described difficulties ventilating their homes:

- wheelchair users unable to reach high windows
- security bars or grilles preventing windows from opening fully
- reliance on caregivers to open/close windows at appropriate times
- fear of opening windows due to safety, noise, or pollution

Those who could ventilate often did so early in the morning or late at night, but this strategy failed during prolonged heatwaves or in top-floor apartments.

2.6.2.3 Behavioural and Sensory Coping

Participants with sensory or cognitive disabilities sometimes adapted environments in specific ways:

- leaving lights on at night due to fear of the dark
- using showers or baths for sensory regulation
- withdrawing to cooler rooms (underground or shaded spaces)
- using fans for sensory stimulation or calming purposes

These behaviours sometimes increased energy use but were necessary for emotional regulation, safety or daily functioning.

2.6.2.4 Common Energy-saving Habits

Despite limited flexibility, participants reported adopting a range of energy-saving practices in an effort to manage costs. These included:

- Minimising appliances use to save energy
- Lowering heating temperature settings and compensating through clothing/ blankets
- Using additional heating sources to only heat the room that is used
- Prioritizing the use of ceiling fans over air conditioning for summer comfort
- Adjusting heating/cooling settings when away from home and/or during off-peak periods (sometimes, switching off these systems even during peak periods, due to affordability constraints in some cases)
- Insulating windows and doors
- Using energy-efficient lighting (LED bulbs) and appliances where available

While passive cooling measures such as shading (blinds, curtains, shutters) are recommended as a practical strategy in the training materials, there is no direct evidence from the participant survey responses or focus group discussions that shading is currently being used by participants to manage summer heat. An exception was observed in the Italian interviews, where participants reported the use of blinds and shutters as part of their summer heat management strategies, reflecting differences in housing characteristics and local practices.

2.6.3 Perceived Barriers to the Adoption of Energy-saving Habits

Focus group participants identified a complex web of barriers that hinder the adoption of energy-saving habits in their daily lives. Physical obstacles, such as the difficulty of installing fans, inaccessible controls, and reliance on shared heating systems, often make it challenging for individuals, especially those with disabilities, to independently manage their energy use.

Financial constraints are equally significant, with high energy costs, unaffordable upgrades, and limited access to subsidies preventing many from investing in more efficient solutions.

Knowledge barriers also emerged, as participants expressed a need for clearer guidance on technical solutions, highlighting a gap in accessible information and support. Administrative hurdles, including complex procedures for obtaining aid and a lack of tailored support, further discourage proactive energy management. In shared households, family dynamics and collective needs can limit individual control over appliance use and energy-saving efforts.

Additionally, technical barriers such as insufficient information about available subsidies and energy-saving technologies are common, particularly in Cyprus, France, and Greece. The adoption of renewable energy solutions like solar panels and heat pumps remains limited due to both cost and regulatory challenges.

Despite these obstacles, some participants reported strategic appliance use—such as limiting usage during peak hours, tracking consumption, and subscribing to off-peak electricity tariffs—as practical responses to their constrained circumstances. At the same time, some participants reported positive experiences with digital or automated solutions where these were accessible. In the Italian pilot, several participants described the use of domotics (e.g. smart thermostats, voice-controlled systems or mobile applications) as enabling greater autonomy, comfort and more efficient energy management. In Cyprus and Spain, isolated cases of smart thermostats usage were mentioned, but uptake remained limited and uneven, often constrained by cost, housing conditions, digital literacy or lack of tailored support.

Despite these opportunities, such technologies were not widely accessible across the sample and did not fundamentally offset the structural, financial and disability-related constraints shaping everyday energy practices.

2.7. Mobility and Transport

Key takeaways
• Powered mobility aids enhance autonomy but increase reliance on electricity for charging and daily use. • Inaccessible public transport frequently forces reliance on private or medical transport. • Transport-related costs and constraints indirectly affect household energy affordability and indoor energy use.

Table 9 Key Takeaways (Section 2.7. Mobility and Transport)

Mobility and transportation emerged as central determinants of both daily autonomy and energy needs for persons with disabilities across all five countries studied. Although the specific challenges vary, participants consistently highlighted a strong interdependence between mobility aids, accessibility of transport systems, and the affordability of energy—particularly in contexts where charging devices or relying on private transport becomes essential for basic participation in social and medical life.

2.7.1 Use of Mobility Aids in Daily Life

Across most focus groups and interviews, individuals reported frequent use of mobility aids such as wheelchairs, electric wheelchairs, scooters, or other assistive devices. These technologies significantly enhance independence, while powered mobility aids also carry specific energy implications.

- **France, Italy,** and **Greece** offered the clearest examples: electric wheelchairs and scooters must be charged daily, increasing household electricity consumption. In Greece, this was explicitly linked to higher energy bills, intensifying existing energy poverty risks.
- Participants in **Italy** also noted insufficient charging infrastructure outside the home, which limits opportunities for independent mobility, restricts participation in community life, and reinforces reliance on home-based charging.
- In **Cyprus and Spain**, mobility issues manifested primarily within the home environment: narrow layouts and insufficient manoeuvring space create internal barriers that hinder the use of mobility aids and affect daily routines, autonomy and comfort.

2.7.2 Accessibility of Public Transport and Reliance on Private/Medical Transport

Lack of accessible public transportation emerged as a shared issue across all countries, though with differing intensity.

- In **Cyprus**, "transport poverty" was explicitly identified. Even when people do not regularly use public transport, this often reflects perceptions of public transit as unsafe or inaccessible rather than a lack of actual mobility needs. Missing real-time information, unclear signage and unsafe pavements further discourage use and push individuals toward car dependency.
- In **France**, accessibility issues were severe and systemic. Broken ramps, missing boarding plates, inaccessible metro stations and unreliable services prevented many from using public transport altogether. As a consequence, participants often depend on expensive private transport or medical transport—yet taxis frequently refuse short trips, and many ambulance companies do not accept electric wheelchairs. This directly affects access to essential medical appointments.
- **Greece** presented similar barriers. Inaccessible buses, uneven streets, heavy doors and the lack of safe pedestrian environments make public transport difficult or impossible for many. As a result, participants rely heavily on taxis, which are significantly more expensive. Limited access to municipal offices due to mobility and transport barriers also restricts access to public support services.
- In **Italy**, structural deficiencies in transport infrastructure and poor accessibility were reported as part of a broader system of barriers that limit mobility. Participants pointed to inadequate communication systems and a lack of tailored services as factors preventing them from meeting basic needs.
- In **Spain**, the focus of mobility concerns was more domestic than transport-related in the workshop extracts provided, but accessibility issues within the home were shown to restrict mobility and independence.

2.7.3 Impact of Transport Costs on Energy Affordability

Transport challenges directly influence energy affordability, especially where mobility choices are constrained.

- In **Cyprus**, the "forced dependence on cars" significantly increases monthly expenses. Participants described the car as a necessary but costly lifeline, especially given the absence of reliable alternatives.

- In **France**, reliance on private vehicles, sometimes petrol cars with high fuel consumption, was not a choice but a necessity due to inaccessible public transport. For most participants, electric vehicles or train travel remain unaffordable, creating a double burden: high fuel expenditure combined with high electricity consumption for mobility aid charging.
- In **Greece**, inaccessible public transport pushes people toward taxis, compounding daily expenses. Some participants stay home more often because mobility is too difficult, which paradoxically increases indoor energy consumption for heating, cooling and comfort.
- **Italy** highlighted the broader intersection of mobility and energy: insufficient charging infrastructure and lack of tailored transport services restrict autonomy, while structural barriers lead to greater dependence on energy-intensive solutions at home.
- Although **Spain** did not report major difficulties accessing public transports, , the need to rely on private vehicles for reasons of comfort and accessibility was mentioned. Reduced outdoor mobility in some cases may indirectly increase time spent at home, with implications for indoor energy use.

2.8. Financial Constraints and Support Awareness

Key takeaways
• Disability-related expenses significantly increase vulnerability to energy poverty across all countries. • Existing financial support schemes are often insufficient, poorly targeted or difficult to access. • Administrative complexity and limited awareness further restrict effective use of available support.

Table 10 Key Takeaways (Section 2.8. Financial Constraints and Support Awareness)

Financial vulnerability emerged as a critical theme across all five country case studies, showing how disability-related expenses, limited awareness of support schemes, and administrative hurdles significantly restrict the ability of persons with disabilities to meet their energy needs. Participants frequently reported feeling excluded from existing aid mechanisms and trapped in a cycle of high costs and insufficient support. Across all five countries, **persons with disabilities face higher living and energy costs** while navigating **support systems that do not reflect**

their real needs, leading to persistent financial strain. Key common issues include:

- **Insufficient or poorly targeted financial aid.**
- **Limited awareness and complex bureaucratic processes.**
- **Gaps between eligibility criteria and actual disability-related expenses.**
- **Inaccessible information and lack of personalised support.**

Participants expressed a clear call for **more inclusive, better-communicated and disability-sensitive financial assistance programmes**, with simplified procedures and recognition of the extra energy costs associated with disability.

2.8.1. Share of Participants Receiving Energy Subsidies or Disability Benefits

Across countries, the percentage of participants receiving subsidies or disability benefits varied widely, but a common pattern emerged: even when benefits are received, they rarely cover the actual costs of disability-related needs.

- **Cyprus:** Benefits were widely described as insufficient, especially in light of high housing and adaptation costs. Even those who receive disability-related benefits struggle with rents and home modifications.
- **France:** Only one participant reported receiving partial reimbursement for electricity related to medical equipment. Most participants felt that severe illnesses and disabilities requiring high energy use are not adequately recognised under current schemes.
- **Greece:** Nearly all participants relied on the state social tariff or disability allowances but emphasised that these were inadequate given their high medical and thermal needs. Many fall into an eligibility gap: income levels are often slightly above subsidy thresholds, yet remain insufficient to cover rising energy and disability-related costs.
- **Italy:** Some participants benefited from subsidies tied to low Equivalent Economic Situation Indicator (ISEE) scores, but these only partially addressed overall financial stress and did not compensate for high energy needs or structural building inefficiencies.
- **Spain:** Only 4 out of 9 participants reported receiving financial or support programmes. However, those who receive disability subsidies often become ineligible for other grants, creating a perceived “penalty” despite higher living costs. Also, it is concerning that many forms of assistance for individuals with

disabilities are calculated solely based on the income of the household. This approach fails to consider the specific expenses associated with disability.

2.8.2. Awareness and Use of Local/National Support Schemes

Awareness of available support schemes was inconsistent and often limited. Many participants across the five countries reported knowing only one or two types of aid, even when more were technically available.

- **Cyprus:** Participants frequently lacked information about available grants or did not know how to apply. Poorly targeted communication and rigid procedures made it difficult to benefit from support even when eligible.
- **France:** Participants lacked information about subsidies for energy-efficient technologies such as heat pumps or solar installations. Even when they were aware, the initial investment required was prohibitive.
- **Greece:** Participants expressed frustration with unclear or poorly publicised online information and limited remote-access services. While some forms of municipal support exist (e.g. provision of firewood or local discounts), many participants remain unaware of these opportunities due to weak communication and accessibility barriers.
- **Italy:** Some participants reported confusion arising from non-transparent billing systems and vague explanations of tariff components, causing stress and difficulty in understanding costs and managing household expenses.
- **Spain:** Many participants were aware only of the "electric social bonus," overlooking other forms of support. Lack of clear communication from city councils, often staffed by people without disability training, led to confusion and slow resolution of requests.

2.8.3. Gaps in Understanding or Accessibility of Support Measures

The focus groups revealed deep structural gaps that limit the usefulness of existing financial support measures. These gaps include *eligibility mismatches, bureaucratic complexity, outdated* or *misaligned benefits*, and a lack of recognition of disability-related energy needs.

2.8.3.1 Eligibility does not Reflect Real Costs of Disability

Across multiple countries, subsidies are tied solely to income thresholds and do not consider the substantial extra costs associated with disability.

- In **Spain**, participants highlighted the "poverty premium": higher costs for medical devices, assistive technologies, and larger housing needs.
- **Greece** and **France** also stressed that many disabilities requiring high energy consumption (medical equipment, stable temperatures) are not recognised by support schemes.

2.8.3.2 Bureaucratic Burdens and Administrative Barriers

Participants described processes that are slow, complex and often inaccessible.

- **Cyprus:** Grants require upfront payments, despite low incomes, and suppliers do not cooperate with state reimbursement systems.
- **Greece:** Physical and informational barriers prevent applications altogether.
- **Spain:** Procedures take weeks or months and municipal staff lack disability expertise, contributing to a sense of loneliness in the whole administrative journey to apply for disability benefits

2.8.3.3 Lack of Tailored or Personalised Support

Support schemes often fail to consider diverse disability needs.

- **Cyprus:** Subsidised equipment is outdated or inappropriate, especially for people with hearing impairments.
- **France:** Only a few severe illnesses qualify for targeted support, leaving many excluded.
- **Greece:** Energy support does not account for medical cooling and heating needs.

2.8.3.4 Financial Constraints Deepen Energy Poverty

High energy costs intersect strongly with disability-related expenses.

- **Cyprus:** Low incomes combined with high electricity costs forced participants to limit cooling and live with unsafe indoor temperatures, reinforcing energy poverty despite existing benefits.
- **France:** Participants described high energy costs and anxiety around electricity bills, particularly during heatwaves, which constrained their ability to use cooling and essential electric equipment despite health needs.
- **Greece:** Participants must keep air conditioning on during summer due to medical needs but receive insufficient aid to cover the cost.
- **Italy:** Economic constraints force households to reduce heating or delay maintenance, directly affecting comfort and well-being.

- **Spain:** Costs for personal care services and assistive equipment intensify financial pressure.

Across countries, participants described **a chronic sense of financial precarity, reduced flexibility to manage rising energy bills, and very limited capacity to invest in energy efficiency measures or adaptive technologies that could improve comfort and reduce long-term costs. This situation reflects not only higher living and energy costs associated with disability, but also a recurring mismatch between real disability related energy needs and the adequacy, accessibility, and design of existing support systems. As a result, energy affordability is experienced not as a temporary hardship but as a persistent structural constraint, reinforcing long-term vulnerability and limiting pathways out of energy poverty.**

Key common issues include:

- **Insufficient or poorly targeted financial aid.**
- **Limited awareness and complex bureaucratic processes.**
- **Gaps between eligibility criteria and actual disability-related expenses.**
- **Inaccessible information and lack of personalised support.**

Participants expressed a clear call for **more inclusive, better-communicated and disability-sensitive financial assistance programmes**, with simplified procedures and recognition of the extra energy costs associated with disability.

2.9. Digital and Energy Literacy

Key takeaways
• Digital and energy literacy affect participants' ability to manage energy use and access support, but levels and experiences vary significantly across countries. • Digital tools can enhance autonomy and energy management, yet affordability, accessibility, and design barriers limit their effective use. • Participants express strong preferences for clear, accessible and inclusive communication formats.

Table 11 Key Takeaways (Section 2.9. Digital and Energy Literacy)

Digital and energy literacy plays a crucial role in enabling persons with disabilities to manage their energy use, access support schemes, and interact with increasingly digitalised environments. Across all five countries, participants

identified significant gaps in access to digital tools, confidence with technology, and the inclusiveness of communication formats. These limitations directly influence their ability to adopt energy-efficient behaviours, operate smart systems, or navigate administrative procedures.

2.9.1 Ability to Use Digital Tools (Smart Meters, Thermostats, Apps)

Digital accessibility varies widely across countries, but several common patterns emerged.

- **Cyprus:** Participants highlighted major accessibility gaps in digital and public information systems, particularly the lack of visual alternatives to sound-based alerts. One participant reported using smart thermostats or timers, but others described digital platforms as complex and poorly designed.
- **France:** Participants recognised the potential of home automation (e.g. voice-activated controls, remote heating adjustment) to support independence. However, high costs limited adoption, and devices did not eliminate the need for human assistance.
- **Greece** No direct use of household smart-energy tools was reported. Participants instead emphasised difficulties navigating online platforms for information and support.
- **Italy:** Experiences were mixed. Some participants reported using domotics and smart-home solutions (e.g. smart thermostats, voice-controlled systems) and described benefits for independence and home management. Others expressed caution related to reliability, privacy, or familiarity. Difficulties understanding energy bills and tariff structures were explicitly reported.
- **Spain:** Although the workshop focused less on digital literacy directly, isolated cases of smart energy controls were reported. However, high costs of assistive and smart technologies were identified as a limiting factor for wider adoption, particularly for people with intellectual disabilities.

2.9.2 Gaps and Preferences in Communication (Written, Audio, Easy-Read Formats)

Major gaps were identified in communication formats and information accessibility, affecting both daily life and interaction with energy systems.

2.9.2.1 Limited Accessible Information in Public and Household Environments

- **Cyprus:** Absence of visual alerts in elevators, public transport, and emergency systems forces individuals with hearing impairments to rely on others for safety, undermining autonomy. Wayfinding is complicated due to lack of signage and accessible digital information.
- **France:** Participants called for more accessible information about subsidies and home-automation support schemes.
- **Italy:** Participants described energy-related information (especially bills and cost components) as difficult to interpret ("mysterious"), creating an information barrier that affects everyday management and confidence in decision-making.
- Spain: There are administrative barriers and a significant lack of disability awareness by municipal staff.

2.9.2.2 Bureaucratic and Digital Barriers

- Complex or poorly designed online forms were highlighted in **Italy, Cyprus,** and **France.**
- Participants face **technological barriers linked to bureaucracy**, including outdated websites, inaccessible documentation, and procedures requiring repeated in-person visits.

2.9.2.3. Preferences for Communication Formats

Participants expressed preferences for accessible, disability-sensitive communication and alert formats, as specifically reported in the cases of Cyprus and Spain, but the level of detail differs across pilots.

- **Written materials in easy-read formats** for cognitive accessibility
- **Visual formats**, especially for individuals with hearing impairments (video, icons, diagrams)
- **Audio formats** and voice-based controls for those with visual or mobility impairments
- **SMS alerts and TV announcements** for emergencies
- **Sign-language support** through video calls or embedded interpretation
- **Clear, jargon-free instructions** for digital and energy tools

2.10. Attitudes toward Renewable Energy and Sustainable Actions

Key takeaways
• Interest in renewable energy solutions exists, but actual adoption is extremely limited. • Financial barriers, housing constraints and lack of tailored information prevent uptake. • Bill reduction, safety and autonomy are stronger motivators than environmental concern.

Table 12 Key Takeaways (Section 2.10. Attitudes toward Renewable Energy and Sustainable Actions)

Attitudes toward renewable energy sources (RES) and sustainable actions varied across countries, yet several common themes emerged: limited financial capacity, lack of information, and barriers linked to housing conditions constrain the adoption of solar PV, heat pumps, and other renewable solutions. **While participants expressed interest in reducing bills and becoming more energy-independent, RES adoption remains extremely low among people with disabilities in all five case studies.**

2.10.1 Awareness of RES Options (Solar PV, Heat Pumps, Community Energy)

Levels of awareness differed significantly across countries:

- **Cyprus:** Renewable energy options were referenced in the discussions: the dataset included reported solar thermal systems for domestic hot water, at least one case of photovoltaic panels at home, and an institutional example where an offer to install PV was delayed by administrative/property constraints (SMILE).
- **France:** Participants showed clear interest and some knowledge of solar PV and heat pumps. Several expressed a desire for “more information about technical solutions,” indicating incomplete understanding of installation requirements, costs, and available support schemes.

- **Greece:** Awareness of high-efficiency or renewable technologies existed as a small number of households reported using solar water heaters or biomass for heating, but adoption remains low. Participants noted the presence of more advanced options but viewed them as unrealistic due to constraints at household or building level.
- **Italy:** Awareness appears minimal. Participants reported no use of renewable solutions in their homes other than high-efficiency appliances. Some participants express strong interest in renewable energy, though high costs and administrative hurdles often prevent action.
- **Spain:** In some cases, awareness exists primarily through the collective actions of one DPO, which installed solar panels in their own buildings. The participants reported no personal use of solar PV or other RES in their individual apartments.

2.10.2 Willingness to Adopt RES and Barriers (Financial, Space, Knowledge)

Across all countries, willingness to adopt RES exists to varying degrees, but practical adoption is very low due to multiple barriers.

2.10.2.1 Financial Barriers (identified in all five cases)

- **Cyprus:** Financial barriers are compounded by bureaucratic complexities and limited personalised support.
- **France:** Photovoltaic panels and heat pumps are seen as desirable but unaffordable. Participants' income levels are often too low to qualify for financial assistance, creating a paradox of exclusion.
- **Greece:** High initial costs and the need to prioritise health-related energy use undermine investment in RES. In some cases, energy-upgrading technologies and adaptations are partially subsidized, but often they still require a financial contribution from the household, which makes adoption impossible even when partial support is provided.
- **Italy:** Participants did not report adopting RES primarily due to high upfront costs and limited perceived feasibility within their housing context.
- **Spain:** Cost was identified as a barrier, but financial considerations were closely intertwined with building- and community-level constraints that prevent individual investment even when interest exists.

2.10.2.2 Space and Housing Constraints

- **Cyprus, Greece, and Italy:** Many participants live in older, inefficient buildings where retrofitting is expensive or technically impossible or constrained by shared ownership or property rules.

- **Spain:** Many live in rental or institutional housing where solar installations are not permitted or not yet connected to individual apartments. There is also a lack of awareness about how to start the implementation process.

2.10.2.3 Knowledge Gaps

- **Cyprus:** Reliance on improvised solutions indicates a limited access to structured knowledge about RES or sustainable alternatives.
- **France:** Participants requested clearer information about available subsidies and technical options for installing solar panels or heat pumps.
- **Italy:** Attitudes toward new technologies were mixed. While some participants were open to adoption of such systems, others expressed caution linked to reliability, familiarity and understanding.
- **Spain:** Participants had not considered RES adoption personally, suggesting a need for more targeted outreach.

2.10.3 Key Motivators (Bill Reduction, Self-Sufficiency, Environmental Concern)

Despite low uptake, several strong motivators for RES adoption were identified:

2.10.3.1 Reduction of Energy Bills

This was the **primary motivator** across all countries. Participants expressed interest in solar PV, heat pumps, or community energy primarily to reduce high, recurring electricity costs driven by disability-related needs (cooling, medical devices, mobility aids).

2.10.3.2 Energy Self-Sufficiency and Independence

- Particularly relevant in **France** and **Greece**, where dependence on expensive energy systems or unreliable support schemes increases vulnerability.
- In Italy, self-sufficiency was explicitly described as a motivator, including interest in a 'sustainable, self-sufficient home' and an aspiration for an off-grid lifestyle. I
- Home automation and RES were seen as potential tools for enhancing independence, though not realistic without major financial support.

2.10.3.3 Environmental Concern

- Environmental motivations were explicitly reported in the Italian pilot (e.g., climate anxiety; valuing LED adoption as 'doing the right thing').
- In Spain, participants acknowledged the environmental and economic benefits of solar panels, but reported being explicitly prohibited from installing them, highlighting that environmental awareness does not translate into adoption when structural barriers are present.

2.10.3.4 Safety and Comfort

- In **Cyprus**, improvisation with whistles, lights, or non-standard systems indicated a desire for solutions that improve safety and daily comfort—suggesting that RES or efficient technologies could be appealing if designed for accessibility.

3. Overall Summary of Results from a broader perspective and Policy Relevance

3.1. Overall insights

The cross-country analysis highlights that disability substantially increases vulnerability to energy poverty through a combination of higher baseline energy needs, reduced flexibility in managing consumption, and structural barriers related to housing, accessibility and support systems. Across all five pilot countries, participants described energy use as closely tied to health, safety and autonomy rather than discretionary comfort, limiting their capacity to reduce consumption without adverse consequences.

Energy use patterns and comfort expectations varied according to disability type, living arrangements and housing conditions, but several common trends emerged. Participants with physical and chronic health conditions consistently reported narrow and medically required thermal comfort ranges, long daily occupancy, and reliance on energy-dependent assistive or medical devices. Sensory and cognitive disabilities introduced additional safety, communication and care-related energy needs, such as lighting requirements, mediated decision-making, and increased laundry or appliance use. These needs intersect with building characteristics, including poor insulation, shared heating systems and limited control over indoor environments, amplifying exposure to both heat stress and cold discomfort.

Despite national differences in climate, housing stock and welfare systems, cross-country similarities were pronounced. Participants in all countries faced rising electricity costs, limited access to tailored financial support, and administrative or informational barriers that constrained their ability to manage energy use effectively. Differences across countries were mainly linked to climatic exposure (e.g. severity of summer overheating), housing typologies, and the organisation of social and disability support, rather than to fundamentally different patterns of need.

3.2. Implications for Policymaking

The findings highlight the need for energy poverty policies to explicitly recognise disability as a structural driver of vulnerability. Existing frameworks largely assume discretionary energy use and behavioural flexibility, which do not reflect the lived realities of people whose energy consumption is shaped by medical requirements, assistive technologies and care routines.

Policy approaches addressing energy poverty should therefore integrate disability-sensitive criteria, including recognition of higher baseline energy needs, medically

required comfort thresholds, and limited capacity to shift or reduce consumption. Energy efficiency and renewable energy programmes must also be designed to be accessible, affordable and compatible with diverse housing and tenure situations, particularly for renters and residents of multi-storey buildings with shared systems. Given the widespread reporting of poor insulation, inefficient envelopes and limited control over heating and cooling systems, policies supporting deep and accessible building renovations are essential to reduce structural energy loss that cannot be addressed through behavioural change alone.

Equally important is the accessibility of policy communication and support mechanisms. Across countries, participants reported limited awareness of available schemes, unclear eligibility rules and inaccessible administrative procedures. Improving the clarity, accessibility and personalisation of information and support is essential to ensure that people with disabilities are not systematically excluded from measures intended to reduce energy vulnerability. In addition, findings from several countries indicate that transport-related energy costs and inaccessible mobility systems significantly affect household energy affordability and time spent at home, suggesting that 'transport poverty' should be recognised as a distinct but interconnected policy dimension when addressing energy vulnerability among people with disabilities.

3.3. Analytical Implications for Energy Use Assessment and Training Content

The qualitative findings presented in this report provide a structured basis for understanding the relationship between user needs, comfort expectations and energy consumption. Reported temperature ranges, duration of heating and cooling use, ventilation constraints, time spent at home, and reliance on assistive or medical devices define the conditions under which energy is consumed by people with disabilities in situations of energy poverty.

These themes also inform the structure and content of training activities by identifying recurring knowledge gaps, essential energy practices, and disability-specific constraints that shape everyday energy use. On this basis, the findings support the development of illustrative, accessible examples linking comfort requirements and daily practices to indicative energy impacts (e.g. temperature setpoints, duration of use, ventilation effectiveness), which can be used to support awareness-raising and learning activities. These insights support the development of training content aimed at improving understanding of energy use and comfort management and to support informed decision-making, while acknowledging that many energy-related practices cannot be reduced without compromising health, safety or autonomy.

3.3.1 Implications for the Content of ASSERT Training Materials

Building on the analytical insights resented above, the findings of this report also provide concrete guidance for the thematic structure of the ASSERT training materials to be developed in subsequent work packages of this project. Rather than assuming discretionary energy behaviours, the evidence highlights the need for training content that reflects disability-related energy needs, structural housing constraints, and accessibility barriers documented across the five pilot countries.

Bases on the empirical results of this report, the foreseen training materials would address the following core thematic areas:

- **Disability and energy poverty nexus**, including non-discretionary energy use linked to health, assistive technologies, care routines and reduced adaptive capacity.
- **Thermal comfort, health and safety**, with attention to medically required comfort ranges, heatwave risks, winter cold exposure, humidity and indoor air quality.
- **Understanding household energy use**, focusing on everyday energy practices shaped by time spent at home, disability-related routines and accessibility constraints.
- **Reading and understanding energy bills**, tariffs and seasonal cost variations, using accessible and inclusive communication formats.
- **Housing conditions and technical barriers**, including shared systems, inaccessible controls, limited autonomy over heating and cooling, and tenure-related restrictions.
- **Realistic coping strategies and energy-saving actions**, distinguishing between avoidable consumption and non-reducible energy use linked to disability and care needs.
- **Financial support mechanisms**, including social tariffs, bonuses, grants and administrative procedures, with guidance on access and eligibility.
- **Digital and energy literacy**, addressing barriers to the use of smart technologies and preferences for accessible, user-friendly interfaces.
- **Renewable energy and energy efficiency options**, presented in relation to actual housing conditions, financial feasibility and potential benefits for autonomy and comfort.
- **Inclusive communication and universal design principles**, ensuring that both content and delivery formats are accessible to diverse disability groups.

This structured alignment ensures that the ASSERT training materials are directly grounded in the lived experiences and constraints identified in this report, while supporting the development of inclusive, realistic and health-sensitive capacity-building actions.

4. Conclusions

This report contributes to addressing a critical gap in the understanding of energy poverty by foregrounding the experiences of people with disabilities across diverse Southern European contexts. It demonstrates that energy vulnerability among disabled households is not primarily driven by inefficient behaviour, but by structural, medical and accessibility-related factors that shape unavoidable energy needs.

By documenting comfort expectations, daily practices, housing constraints and financial pressures, the report provides a coherent evidence base showing how disability and energy poverty intersect. The findings emphasise the importance of inclusive, human-centred approaches that recognise health, autonomy and safety as central dimensions of energy use.

Further, the analysis highlights that effective responses to energy poverty must move beyond generic solutions and incorporate disability-sensitive perspectives into policy design, communication and support mechanisms, particularly in contexts where standard eligibility criteria, housing conditions or digital systems systematically exclude people with disabilities, ensuring that efforts to improve energy affordability and sustainability do not inadvertently deepen existing inequalities.

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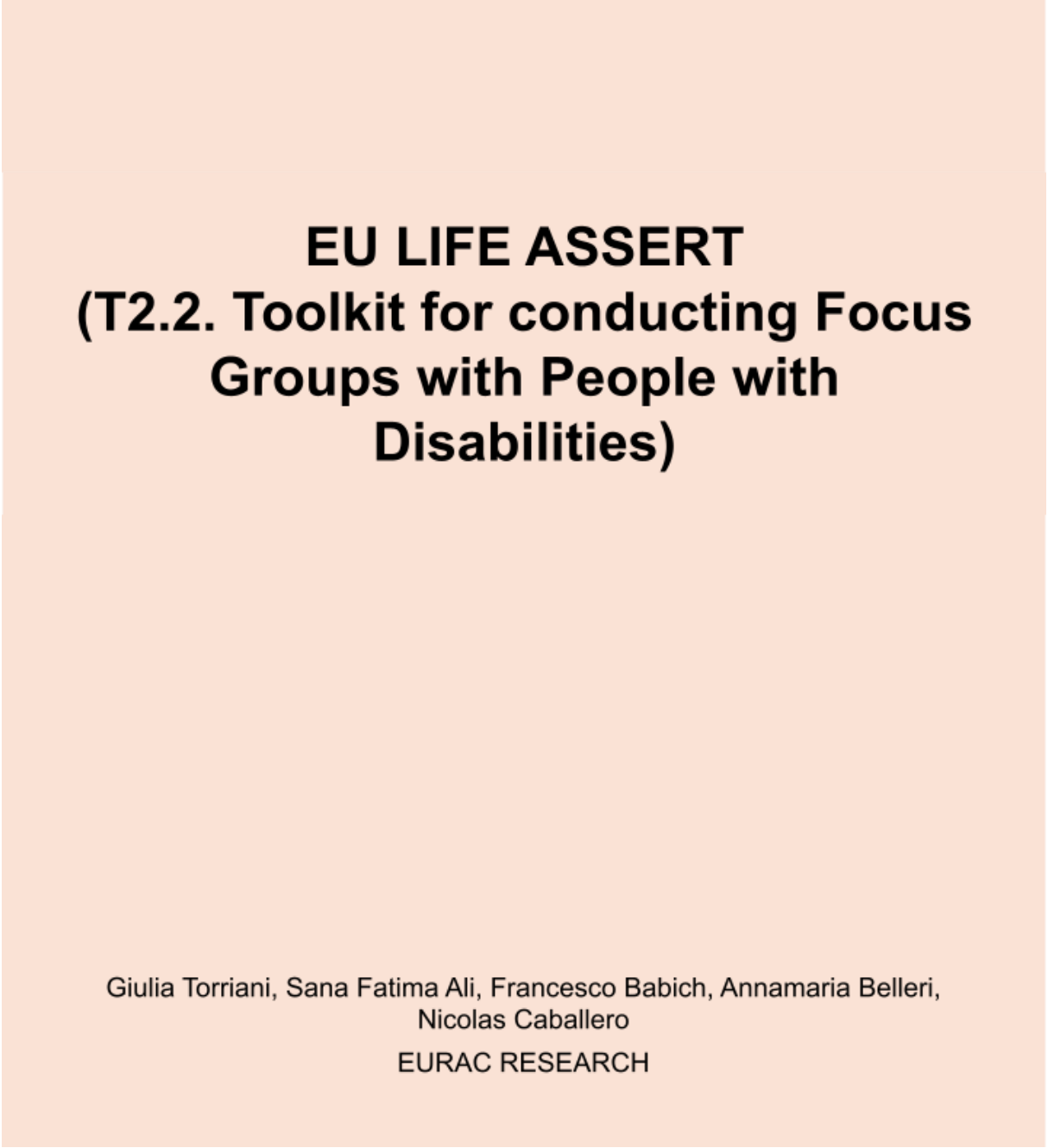
6. Appendices

6.1. Focus Group Methodology Details



Introduction

Deliverable 2.2 (D2.2) of the ASSERT project focuses on the organisation and implementation of **Focus Groups** aimed at gaining a deeper understanding of the energy needs, expected indoor comfort conditions, and energy practices of individuals with disabilities experiencing energy poverty. The objective is to collect insights into their typical daily energy consumption and challenges related to energy use.

To achieve this goal, each pilot partner will conduct **one Focus Group** and **one Survey,** as part of the Focus Group, in their respective country. The focus groups will engage from **10 to 20 participants*** with disability and facing energy poverty. The Survey, before the actual discussion with participants, has the aim to gather social and demographic information. The Focus Group will allow the participants to discuss different challenges of their daily energy use. The collected data will provide valuable qualitative insights into their lived experiences, informing future interventions and policy recommendations.

If, despite best efforts, a focus group cannot be organised, individual interview(s) may be conducted instead, following the same objectives and themes (see Annex 5).

As part of this effort, a dedicated **Toolkit has been developed to guide the piloting partners** in effectively **organising, conducting, and analysing data coming from the Survey and the Focus Group/ Individual Interview(s)**. The Toolkit offers comprehensive instructions on key aspects such as:

- The process for selecting and recruiting participants;
- The data management protocols;
- How to build 1) Informed Consent Form, and 2) Privacy Notice;
- How to organise and accessible event;
- The topics to be covered in the survey and in the focus group/ individual interview(s);
- The experimental procedures;
- The analysis of data and reporting procedures.

All procedures in this toolkit remain valid even if individual interviews are conducted.

Please note: *This toolkit offers various tools and ideas for conducting the Focus Group/ Individual Interview(s) (and the related Survey). Among the potential costs that may arise are venue rental, hiring a sign language interpreter, or translating materials into braille. However, the budget available for conducting the focus group/ Individual Interview(s) is limited and may not allow for all options simultaneously. Not all partners will necessarily face the same expenses—for instance, in some cases, venue rental may not be needed, allowing the budget to be allocated to support services such as a sign interpreter. In other cases, the budget may need to cover venue-related costs, leaving no resources for additional support. In such cases, participants who require assistance may be asked to bring someone with them to support their communication needs. As these are context-specific situations, and this toolkit is intended to provide general guidance, budget decisions are left to be evaluated and managed on a case-by-case basis by the piloting partners.*

*Due to the very limited budget allocated for the organisation of the focus groups, project partners decided to opt for a single focus group per municipality, involving a larger number of participants (10–20 people). However, it is strongly advised to split the group in 2 subrgoups if there are more than 12 participants.

*Where recruitment for a group session is not feasible, partners may schedule individual interviews to collect equivalent qualitative insights (Annex 5).

Participant selection process

Profile of participants anticipated for the focus group/ individual interview(s)

To ensure a diverse and representative sample, the focus groups/ *individual interview(s)* may include participants with different backgrounds and experiences:

- **Types of disabilities**: A mix of individuals with different disabilities should be represented, including mobility impairments (e.g., wheelchair users), visual or hearing impairments, among others.
- **Diversity in socio-demographic factors**: A balance of different age groups (young adults, middle-aged, elderly) and different genders; Participants from various socio-economic backgrounds, including those living alone, with families, or in assisted housing. Piloting partners may refer to national or regional disability statistics to better reflect the local reality and ensure that the diversity within the focus groups is representative.

- **Direct experience with energy poverty**: Individuals who struggle with maintaining adequate indoor temperature due to financial or structural barriers; Residents of housing with poor insulation, inefficient heating/cooling systems, or high energy costs; People relying on specific energy-consuming medical equipment (e.g., ventilators, electric wheelchairs, home oxygen therapy).

Eligibility criteria

To ensure the study effectively captures the energy needs and indoor comfort expectations of people with disabilities in energy poverty, some eligibility criteria should be communicated during the recruitment phase.

Inclusion criteria:

- Age: 18+
- Participants should include individuals with physical disabilities.
- Participants should belong to a vulnerable group facing challenges in accessing or affording energy for household needs.
- Participants should reside in one of the target countries of the project (Italy, Spain, Greece, France, Cyprus).
- Participants should have the opportunity to express their experiences, opinions, and needs in a written survey and in a group discussion setting, either independently or with the help of an assistant.*
- Participants (or their legal representatives) must provide informed consent for participation in the survey and the focus groups/ individual interview(s), in compliance with GDPR and ethical research guidelines.
- In cases where the topic involves children (e.g. households with children with disabilities), the adult caregiver (such as a parent or guardian) should be the one participating in the focus group/ individual interview(s).

*To clarify, a person who is present solely to assist a participant with a disability (e.g. for communication or mobility support) should not be counted as a participant in the focus group/ individual interview(s). Only individuals who actively take part in the discussion and provide input should be considered participants. However, it's important to ensure that assistants are welcomed and that any support needs are fully accommodated.

*If the focus group cannot be convened, partners may conduct individual interview(s) with participants meeting the same inclusion criteria until the planned total (10–20) is reached.

Recruitment instruction

This section outlines **how** participants will be contacted and **through which channels**. Different recruitment strategies may be implemented by the pilot partners based on their specific needs. Participants may be reached via email, phone calls, or direct (face-to-face) invitations.

Pilot partners are expected to draw on their knowledge of the local context and their existing networks to identify the most appropriate channels. Where needed, they may also consult with local stakeholders or organisations that work with the target groups to obtain relevant contact information and recruitment support.

The recruitment materials, including flyers, emails, phone calls or other communication tools, must include the following information:

- A description of the activities (survey + focus group);
- The location and date of the Focus Group;
- The eligibility criteria (as detailed in the previous section);
- Contact details of the pilot partner (phone and email) for further information and to express willingness to participate.

If needed: The same recruitment materials and channels may be used to invite participants to a one-to-one interview when a focus group cannot be arranged.

The document used for recruitment (flyer, LinkedIn post, etc.) must necessarily contain the ASSERT logo, the European Union logo, and the European grant reference number for the ASSERT project (Reference: LIFE23-CET-ASSERT/101167584). CCR Projects will support in building the recruitment materials.

Incentives for Participation

Recruiting participants for a focus group/ individual interview(s)—especially one that may last several hours—can be challenging. To support the recruitment process and encourage participation, it is helpful to offer incentives that recognise participants' time and contribution.

Incentives do not necessarily need to be financial; they can also take the form of project-related support or services that are valuable to the participants. For example, one option could be to offer tailored recommendations based on the analysis of their electricity bills, helping them better understand their energy use and identify opportunities for savings or improved comfort.

Other possible incentives might include:

- Access to project findings or personalised feedback
- Information on energy efficiency or support programmes
- A certificate of participation
- Light refreshments or travel reimbursement (if applicable)

The type of incentive should be decided locally, depending on the available budget and the needs and preferences of the target group. Where possible, incentives should be mentioned clearly during recruitment to ensure transparency and increase motivation to participate.

Data management

This section outlines the data management procedures for handling the data collected before, during, and after the survey and focus group.

Types of data processed

The survey and focus group will process both personal data, which includes demographic information such as age and gender, and sensitive data, which includes health-related information.

Also applicable to interview(s): The same data categories and safeguards apply if individual interview(s) are conducted.

Methods of collecting personal and sensitive data

Data collection will occur through direct methods, where data will be gathered directly from individuals with disabilities through structured discussions and questionnaires, and indirect methods, where information may be received through intermediaries such as local associations or caregivers who provide relevant data on behalf of participants. The direct method is preferable.

How will the research results be made public?

The dissemination of the survey and focus group results will be conducted strictly in an anonymous and aggregated format. Research findings may be shared through scientific articles, including open-access publications, conference presentations, and project deliverables and reports. These measures will ensure that participants cannot be identified in any way.

Will individual participants be informed about the research results?

Individual participants may receive a summary of the research results if they express interest. The dissemination of these results will be anonymous and aggregated, meaning that group results will be shared without individual identification. These summaries will be delivered via personal email (or phone number) upon request.

Participants' contact details, such as email addresses or phone numbers, will only be used for follow-up communication related to the study. These details will be retained until the project's final deadline and will not be used for any other purposes.

Processing and storage of personal data

To ensure compliance with data protection principles, the following technical and organisational measures will be implemented. Each participant should be assigned a unique ID, and their names and contact details will be linked to this ID and stored in a password-protected folder. Specific safeguards for sensitive data will include measures such as encryption, restricted access, and secure servers. At the conclusion of the research project, all personal data will be anonymised by removing any identifying elements.

To maintain data integrity and confidentiality, it is recommended that each pilot partner store their raw data in separate folders to prevent unauthorised access (external organization folders). Anonymous and aggregated data, as well as activity reports should be stored in ASSERT Google Drive folder, so that other consortium members can have access.

Who will have access to the data collected during the focus group?

Access to the collected data will be structured in a controlled manner. Piloting partners in each country will have access only to the raw data from their respective focus groups. Other consortium members will only have access to anonymous and aggregated data (at the country level).

All provisions in this section apply equally to interview audio/video files, transcripts, and notes when individual interview(s) are conducted.

Information Sheet, Consent Form, and Privacy Notice

This chapter outlines the ethics and privacy procedures for the processing of collected data in the Survey and Focus group. Two documents should be provided to participants: 1) Information Sheet and Consent Form and 2) Privacy Notice. Those modules could be provided in paper format or digitally, depending on each partner's choices.

How will participants be informed about the study and the activities in which they will participate?

Piloting partners should ensure that participants will be informed about the study and the procedures they will undergo by reading the information provided in **Annex 1: Modules (Information Sheet and Consent Form)**. The information sheet should be given to participants during the recruitment phase.

How will consent for participation in the project be obtained and documented?

Each participant will be informed in advance using simple language about the study's general objectives and procedures. Specifically, the following will be explained: i) The purpose and general objectives of the experiment; ii) The possibility to withdraw from the study at any time without providing any explanation; iii) The confidentiality of the data provided; iv) Who to contact for further information and communication during the study. Only after the participant confirms that they have been thoroughly informed will they be asked to sign the consent declaration for participation. Once the experiment is completed, participants will be informed about the specific purposes of the research through communication from the researcher, who will also be available to provide further explanations upon request. The Informed Consent Form should be signed by participants before the beginning of the pre-focus group survey **(Annex 1: Modules (Information Sheet and Consent Form))**.

How will participants be provided with the Privacy Notice regarding data processing (pursuant to Article 13 of Regulation EU 2016/679)?

The Privacy Notice **(Annex 1: Modules (Privacy Notice))** will be provided to participants before the survey. If the survey will be administered in paper format, the Privacy Notice will be provided in paper format. If the survey will be administered via online platforms (e.g., via SurveyMonkey or Google Form), the Privacy Notice will be provided digitally. This decision depends on pilot partners' choices.

Is the dissemination of personal data in non-anonymous and/or non-aggregated form planned (e.g., photos, video recordings of participants)?

The communication of personal data in non-anonymous and non-aggregated form is not planned.

The dissemination of personal data in non-anonymous and non-aggregated form, such as photos, video, and audio recordings of participants, is planned.

The transfer of personal data in non-anonymous and non-aggregated forms outside the EU is not planned.

The inclusion of data in anonymous and non-aggregated forms in open-access databases is not planned.

Involving Participants Unable to Provide Written Consent

Considering that information must be provided to all potential participants, methods for informing those who cannot provide written consent and obtaining their "assent" will be detailed in the Guide for Accessibility chapter.

All provisions of information sheet, consent form, and privacy notice in this section apply equally to individual interview(s), if conducted.

Guide for accessibility

This section provides pilot partners with instructions on how to organize an accessible in-person or remote event (depending on each partner's choices and preferences) for people with disabilities. It is based on the recommendations from the European Disability Forum (EDF) Guide for Accessible Meetings for All[1]. Please read this guide prior to organising the focus group.

Where individual interviews are conducted, they can be arranged remotely or at an accessible location chosen with the participant, where the same accessibility provisions apply.

An accessible event

Ensuring accessibility in the focus groups is essential to allowing attendees with disabilities to fully participate and engage with both the content and other participants. People with disabilities attending these events may include individuals who are blind, deafblind, deaf, or have motor impairments, among others. To accommodate diverse needs, appropriate support measures should be in place. These may include **accessible rooms** and **bathrooms, sign language interpretation and captioning**, and **easy-to-read information or explanatory materials** shared in advance of the meeting.

Logistics to access the event

Logistical preparations are key to ensuring accessibility. It is recommended to visit the venue in advance to assess various accessibility aspects, including the entrance, meeting room, corridors, toilets, lifts, and surrounding areas such as proximity to public transport and parking. Additionally, **accessibility requirements should be collected before the meeting** using a designated form **(Annex 2: Accessibility Requirements)**, which should cover special dietary needs, transport needs, and accessible parking availability, among others.

During the meeting:

During the meeting, facilitators should address participants directly rather than speaking through an assistant or interpreter. For participants with hearing impairments, it is important to determine their preferred communication method, whether signing, lip-reading, or captioning. When interacting with individuals with visual impairments, facilitators should introduce themselves and others clearly, stating where people are positioned in relation to the participant to provide spatial awareness.

Meeting materials should be provided in accessible formats, such as large print, easy-to-read formats, braille format, and accessible electronic versions. The recommended font is a sans-serif font (e.g., Arial, Verdana, Tahoma, Calibri, Helvetica).

[1]https://www.edf-feph.org/content/uploads/2021/02/edf_guide_for_accessible_meetings_1.pdf

The recommended font size for standard print is 12-14 pt, for large print at least 18-20 pt (for people with low vision), and for screens at least 22 pt. **If a palantypist or sign language interpreter is required, this must be arranged in advance to ensure their availability.**

Topics to be covered in the Survey and in the Focus Group

During the focus groups, open-ended questions will be employed. Before the focus group, a quick survey will be used to assess socio-demographic data and energy use information.

If individual interview(s) are conducted, use the same topics and open-ended approach in a one-to-one format, and ensure the survey is completed before the interview.

This section provides piloting partners with an overview of the content of the survey and the focus group/ individual interview(s). The full set of questions and printable tables can be found in the annexes and are available for use.

Annex 5: Contains the interview question set to be used in case individual interview(s) are conducted.

The information to be collected in the **survey (before the focus group/ individual interview(s))** are as follows:

Socio-demographic Data:

- Age, income (ranges), type of disability, other illnesses.
- Reliance on assistance programmes.
- Level of autonomy and whether they live alone or with others.

Geographical and Climate Context:

- Location (e.g., Urban, rural, or semi-urban areas).
- Climatic Zone: Seasonal variations, extreme temperatures.

Energy Consumption

- Energy expenditure and provider details (energy debts?).

Building Characteristics:

- Dwelling type (e.g., single-family, apartment, etc.).
- Energy-related characteristics (insulation, windows, HVAC systems, appliances, interfaces, air infiltration, traces of mould etc.).
- Number of occupants, year of construction, and building energy rating or certification (if they have it).
- Use of renewable solutions (e.g., rooftop solar, energy-efficient appliances, etc.).

Energy Practices:

- How many hours they stay at home
- Daily habits related to heating, cooling, lighting, cooking, and appliance use.
- Energy-saving behaviours and preferred energy-saving measures.
- General lifestyle and routine information to estimate energy consumption.
- Mobility considerations within the home, including accessibility and adaptability of energy systems.
- Do you receive any assistance related to your disability and/or energy poverty situation?
- Transport (related to energy needs) info to explore the transport poverty concept

The focus group/ individual interview(s) discussion will mainly revolve around three key topics: comfort needs, barriers to energy accessibility, and desired support. Below are some examples of issues that may emerge within these three main areas during the discussion.

Comfort:

- Perceived indoor environmental quality: Air quality, temperature, humidity, and typical seasonal variations in different rooms.
- Specific challenges faced during extreme weather conditions.

- Personal factors: age, metabolic rate, cultural habits, clothing levels.
- Self-assessments of indoor thermal comfort, lighting quality and efficiency, cooking, and water heating systems.
- Desired temperature and humidity levels, thermal comfort perception
- Health problems related to my accommodation (asthma, chronic illness, frequent headaches, allergies)?

Support:

- Participation in energy communities/cooperatives or energy-sharing schemes.
- Engagement in environmental or renewable energy discussions.
- Interest in local energy cooperatives or initiatives post-training.
- Energy literacy and knowledge about renewable energy options
- Satisfaction with energy-saving solutions implemented.

Barriers to Energy Access:

- Financial, technological, or physical limitations in managing energy consumption.
- Accessibility issues related to energy systems.
- Considerations based on the vulnerability pathway model.
- Suggestions/methods for improving access to energy to meet their specific needs

Annex 3 provides the questions to be asked in the Survey. Additionally, Annex 4 provides examples of printable templates that can be used to conduct the focus group. It is recommended that each participant uses a different combination of post-it colour and formats (e.g., yellow square, green round etc) and that the experimenter notes this information at the beginning so that, in the end, the experimenter can link the different responses to each participant. Survey and Printable templates should be translated in each countries' language.

Annex 5 contains the interview question set to be used in case individual interview(s) are conducted. All provisions applicable to this section apply to Annex 5 as well.

Experimental procedures and timing

This chapter outlines the experimental procedures and timing of the survey and focus group.

Two weeks before the focus group, participants will receive the questionnaire to complete, along with the Information sheet, Informed consent form, and Privacy Notice to sign. The questionnaire must be completed at least one week before attending the focus group.

n.b. Blind participants will be asked whether a family member or friend can assist them in completing the survey.

Focus Group:

The first 10 minutes will be dedicated to welcome and introduction. During this phase, it is necessary to: explain the procedure and structure of the session, make sure that we have signed consent forms from all participants,and ensure that accessibility needs are met.

The discussion will then proceed one poster at a time (***Annex 4: Printable templates for focus group***) and will involve one moderator and one note-taker. The moderator will introduce the main question and ask participants to provide their feedback, the note-taker will take note.

If more than 10 people will be recruited, it is suggested to split the people into two smaller subgroups (and maybe one group online if necessary), each guided by a moderator and a note-taker. Within each subgroup, participants can engage in discussion while the note-taker takes notes.

At the end of each discussion round, the note-taker will read the notes, and the floor will be open for additional thoughts or clarifications (5 minutes).

Finally, during the closing session, it will be necessary to: express gratitude for participants' contributions, provide any necessary follow-up information or resources (e.g., contact emails).

Figure 1 shows detailed timing.

If an individual interview is being held, conduct semi-structured individual interviews covering the same three themes (comfort, barriers, support), with almost equal time distribution within the three themes, and following the same consent and recording practices (see Annex 5).

- **Tips for Data Collection**:
    - Use audio recordings (with participants' consent) and take detailed notes.
    - Observe body language, tone of voice, and interactions to capture non-verbal nuances.
    - Ensure a balanced discussion, avoiding situations where one or a few individuals dominate the conversation.

- Allow participants adequate time to respond.
- Use a checklist to ensure no essential items are forgotten.

Apply the same tips when conducting individual interview(s).

Table 13 Experimental procedures and timing

180 min (3h)								
10 min	45 min	5 min	45 min	5 min	15 min	45 min	5 min	5 min
Welcome and Introduction	Thematic Discussion 1: "How comfortable do you feel with your energy use at home?"		Thematic Discussion 2: "What are the main barriers for you to access and use energy (or transport)? "		Break	Thematic Discussions 3: "What support would you like to receive to make it easier for you to access and consume energy (and be mobile)?"		Closing and Thanks
Outline session structure and ensure accessibility needs are met Consensus	Each theme is introduced using the guiding question by the moderator. Participants will	Note-taker will summarise key insights and the floor will	Each theme is introduced using the guiding question by the	Note-taker will summarise key insights and the floor will be open for additional	Light buffet (optional)	The third theme is introduced using a guiding question. Participants will give responses, followed by a facilitated discussion. Facilitator summarise s key	Note-taker will summarise key insights and the floor	Express gratitude for participation. Provide any necessary follow-up information or

	give feedback.	be open for additional thoughts or clarifications	moderator. Participants will give feedback.	thoughts or clarifications		insights at the end of the thematic discussion.	will be open for additional thoughts or clarifications	resources.

Analysis and reporting procedure

Saving raw data

Data collection will include the following materials:

- Raw data coming from the questionnaire
- Audio/video recordings (if consent is given)
- Transcriptions of the discussions
- Annotations of interactions, body language, and tone of voice
- Posters with sticky notes filled out by participants.
- Structured observations, such as notes on who speaks the most, who is more influential, and group dynamics.
- Energy bills*

Piloting partners should ensure that all this data is stored securely and organized systematically, using labelled subfolders for different types of content (e.g., "Audio Recordings," "Field Notes, "Photos," etc.) to facilitate retrieval and analysis. Implement measures to protect sensitive data, such as password protection and restricted access. Please refer to the section related to Data Management.

*Piloting partners should ask participants to send their energy bills via mail.

The provisions in this section apply equally to focus group and individual interview(s).

Thematic Analysis

While survey scales can be analysed employing quantitative methods (e.g. descriptive statistics), qualitative data (i.e., those coming from the focus group

discussion/ individual interview(s)) should be analysed employing qualitative methods, such as Thematic analysis. Piloting partners should analyse their data, with the support of Eurac Research (if needed). This section applies equally to focus group and individual interview transcripts.

Thematic analysis (Figure 2) is a qualitative technique that allows for the identification, organization, and interpretation of key themes within collected data. It is particularly useful when aiming to extract meaning and insights from qualitative data without relying on complex software. The following sections outline the stages of this type of analysis with some empirical examples.

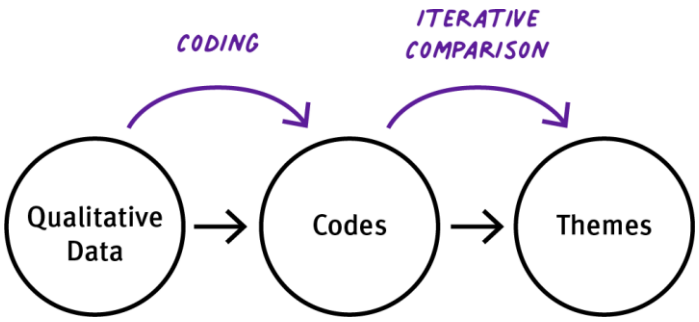


Figure 1 Thematic analysis

Stage 1: The process begins with becoming familiar with the data. This involves reading and re-reading the transcripts, notes, and any other collected materials. During this stage, take initial notes on recurring ideas, patterns, or significant points that emerge from the data.

Example of Transcript Excerpt: "*In winter, my house is always cold because I can't afford to turn on the heating all day. I use blankets and heavy clothes, but with my disability, moving becomes more difficult when it's too cold*"

Initial Impression**:** Issue of **thermal comfort** and **forced adaptations** due to **energy poverty**.

Stage 2: The next step is open coding. Coding is the process of labelling sections of text with keywords or categories. Highlight significant words/phrases and assign labels (codes) to recurring concepts. Result: multiple codes that represent the main issues.

Open coding example:

Text	**Assigned code**
In winter, my house is always cold	Thermal discomfort

I can't afford to turn on the heating all day	Energy poverty
I use blankets and heavy clothes	Adaptive behaviours
moving becomes more difficult when it's too cold	Impact on mobility

Stage 3: After coding, group similar codes together to form broader themes. Identify patterns among the codes. You may use a concept map to organize the themes. Group the similar codes under more comprehensive themes.

Examples of Themes and Sub-themes:

Theme 1: Thermal Comfort and Vulnerability

Insufficient thermal comfort
Impact of cold on daily activities
Difficulty in maintaining heat (forced adaptations)

Theme 2: Economic Barriers and Energy Choices

Economic restrictions
Limited use of heating
Forced energy-saving strategies

Theme 3: Disability and Energy Management

Need for high-energy medical devices
Difficulty accessing alternative solutions
Reproduce your experiences

Stage 4: Give a name and description for each theme. Add some examples coming from empirical data.

Final Example of Themes

Theme	Description	Example from Data
Impact of Cold on Daily Life	Cold in the home causes difficulties in movement and autonomy for people with disabilities.	*"Moving becomes more difficult when it's too cold."*

Forced Energy Choices	Economic restrictions limit energy use, with adaptation strategies such as reducing heating.	*"I only turn on the heating for a few hours."*
Limited Access to Energy Solutions	People with disabilities often cannot adopt alternative solutions to heat or cool their homes.	*"I can't install a heater because I can't move it."*
Dependence on Caregivers for Energy	Some participants rely on others to manage energy use in the home.	*"If my assistant doesn't come, I can't turn on the heater."*

Thematic analysis can be done manually or using software such as NVivo, which allows for managing large amounts of textual, audio, and visual data.

Reporting process

The results of the thematic analysis should be presented in a document containing the following sections:

- Introduction: Objectives of the research.
- Methodology: collection of data and thematic analysis
- Description of Main Themes: Name of each theme, a description of the theme, and examples from raw data.
- Relationships Between Themes and Possible Explanations.
- Conclusions: (and possibly recommendations and ideas for developing training materials).

A report template is provided in **Annex 6: Reporting document structure**.

Reporting note: Indicate whether data were collected via a focus group or via individual interviews.

Eurac Research will compare and summarize the results once all the reports will be ready.

ANNEXES

Annex 1: Modules

Below are examples of: 1) Information Sheet and Consent Form, and 2) Privacy Notice. This refers to the Italian case (Eurac Research) and should be appropriately adapted to comply with the legal specifics and requirements of each country. Also, grey-highlighted wording should be changed for each country, and the documents should be translated in each country's language. Participants' signatures are required before starting the survey.

INFORMATION SHEET AND CONSENT FORM TO PARTICIPATE IN THE RESEARCH PROJECT

Dear Participant,

We invite you to take part in a research project titled "EU LIFE ASSERT (Large-scale multiactor training and mentorship programme to ASSist people with physical impairments in energy povERTy" and funded by the European Commission (101167584). The research is conducted by the Institute of Renewable Energy at Eurac Research. The Information Sheet provides detailed information about the purpose and structure of the research project, allowing you to make an informed and voluntary decision about your participation. The Privacy Note covers the Information on data processing to be provided pursuant to Articles 13 and 14 of EU Regulation 2016/679.

Please review the following information carefully. The researchers involved in this project are available to answer any questions you may have.

Researcher(s) involved in the research project are:

Sana Fatima Ali, sanafatima.ali@eurac.edu

Francesco Babich, francesco.babich@eurac.edu

Annamaria Belleri, annamaria.belleri@eurac.edu

Giulia Torriani, giulia.torriani@eurac.edu

What is the purpose of this research project?

ASSERT focuses on addressing energy poverty by training policymakers, energy practitioners, and front-line workers to understand and respond to the needs of energy-poor households, particularly those with physical disabilities. These

individuals face higher energy needs and lower incomes, making them more vulnerable to poor health conditions linked to energy poverty. The project will provide targeted training and mentorship, starting with a gap analysis, to ensure that local authorities, intermediaries, and energy-poor households can access energy-efficient solutions and participate in the clean energy transition. ASSERT aims to break the cycle of energy poverty by equipping key actors with the skills and knowledge to better support these communities.

One survey and one focus group are organized to understand energy needs, expected indoor comfort and energy practices of people with disabilities. The survey and focus group will process both personal data, which includes demographic information such as age and gender, and sensitive data, which include health-related information.

How will the research be carried out?

One focus group will be organized in (address) the (date and time). The expected number of participants are 10-20. During the focus group, the researchers will gather a deep understanding of the energy needs, expected indoor comfort conditions, and energy practices of individuals with disabilities experiencing energy poverty. In particular, the following topics will be discussed and recorded:

- Perceived and desired indoor conditions,
- Specific challenges faced during extreme weather conditions,
- Energy consumption (e.g., energy literacy and satisfaction with energy-saving solutions implemented)
- Financial, technological or physical barriers to energy access.

If the focus group cannot be organised, an individual interview may be scheduled with the participant, covering the same topics and with the same safeguards.

Additionally, participants will be required to fill out a questionnaire before the scheduled date for the focus group. The questionnaire will ask the following information:

- Socio-demographic data,
- Geographical and Climate Context,
- Energy consumption,
- Building characteristics,
- Energy practises,

- Type of disability.

The questionnaire will be implemented using SurveyMonkey and will be accessible via a link that will be sent via mail.

Participants will be asked to send the latest energy bills via mail. The focus group/ individual interview(s) will be held in Italian. The focus groups/ individual interview(s) will be recorded and used only for research aims. Photos and Videos will be also taken. Data and quotes will be anonymized. Participants have the right to withdraw at any time both in the survey and in focus group.

The questionnaire will be available in Italian only.

What will be expected from research participants?

Participants will need to fill out the questionnaire one week before the scheduled date for the focus group/ individual interview(s). Participants will also need to actively participate in the discussion during the Focus Group/ individual interview(s). Participants should bring their latest energy bills with them during the Focus Group/ individual interview(s).

Before the focus group and/or individual interview(s), participants will be required to assess their access requirements via the specific module.

Participants must meet the following eligibility criteria:

- Age: 18+
- Participants should include individuals with physical disabilities
- Participants should belong to a vulnerable group facing challenges in accessing or affording energy for household needs.
- Participants should reside in one of the target countries of the project (Italy, Spain, Greece, France, Cyprus).
- Participants should have the opportunity to express their experiences, opinions, and needs in a written survey and in a group discussion setting, either independently or with the help of an assistant.
- Participants (or their legal representatives) must provide informed consent for participation in the survey and in the focus groups, in compliance with GDPR and ethical research guidelines.

How long does participation in the research project last?

Each participant will take part in the focus group/ individual interview(s) for one day in …. .

How will the collected data be used?

Data collected will be processed through descriptive statistics and thematic analysis. The data may be shared with the national and international scientific community – in the form of scientific publications or project deliverables - in an anonymized format.

In order to safeguard personal data, each participant shall be assigned a unique identification code, which shall be solely accessible by Eurac for the purpose of correlating the identification code with the respective individual. The key linking the identification code to the participant's identity shall be securely stored in a password-protected file.

CONSENT TO PARTICIPATE IN THE PROJECT

The undersigned

DECLARES to have understood the contents and objectives of the above-mentioned project and to participate voluntarily in the project.

Consent may be revoked in writing at any time without giving reasons, with the consequence that the interview may no longer be used. Publications that have already taken place are not affected by the revocation.

Place, date_____ Signature _____

PRIVACY NOTICE

Research project: EU LIFE ASSERT (Large-scale multiactor training and mentorship programme to ASSist people with physical impairments in energy povERTy.

In accordance with current data protection regulations, we hereby provide you with information about how your data is processed. All personal data is dealt with in compliance with EU Regulation No. 2016/679 (GDPR) and the national legislation. The processing of personal data by researchers is based on principles of integrity, legality, transparency, and confidentiality.

1. Data Controller and Data Protection Officer (DPO)

Data Controller: Eurac Research – Viale Druso 1, 39100 Bolzano, in the person of the legal representative pro tempore.

You can contact the DPO under the following e-mail address: privacy@eurac.edu.

2. Purpose and Legal Basis for the Data Processing

Any and all personal data that is in the possession of the Controller, or that may be requested by the Controller, is necessary for the following purposes:

- Participation in the research study and thus use of the data for research purposes, as specified in the Information Sheet and Consent Form to participate in the study;
- Communications by e-mail (including the sending of the link to the questionnaire);

During the test photos, video and audio recordings may be taken.

Within the framework of the project, special categories of personal data may also be processed in accordance with Art. 9 GDPR (health data). The personal data that are processed are specified in the Information and Consent Form to participate in the study. The data collected are adequate, relevant and limited to what is necessary for the purposes of the processing.

The legal basis for the processing of your personal data for the purposes indicated above is your consent to the processing of your personal data (art. 6, par. 1, lett. A; art. 9, par. 2, lett. A).

3. Recipients of the Data Processed and transfer of data

The recipients of the data are the employees of the Institute of Renewable Energies - persons in charge of data processing activities, authorized and instructed by the data controller to data processing activities. Personal data may be communicated to external service providers (e.g. sending e-mails and analysing the functional capability of the website), which typically process Personal Data on behalf of Eurac Research as data processors.

The scientific results (e.g. publications of scientific papers) may be disseminated only in aggregated and anonymized form only or rather in such a manner that it is impossible identify the individuals.

For questionnaires Eurac Research uses Survey Monkey (for further information: https://www.surveymonkey.com/mp/legal/privacy/). The data is pseudonymized through the use of an unique ID code that is assigned to each participant and which shall be solely accessible by Eurac Research.

To provide certain services Eurac Research and the Free University of Bolzano manage together the scientific platform Scientific Network South Tyrol which connects their data centers. Eurac Research and the Free University of Bolzano are Joint Controllers of the personal data processed in this context and, accordingly, have entered into an agreement pursuant to art. 26 of the GDPR.

Your data is stored within the European Union and Eurac Research does not intend to transfer Your data to third countries or international organisations. Some personal data could be transmitted to third countries outside of the EU but only if the transmission of personal data is connected to the performance of the institutional activities of Eurac Research. Where data is transferred to a third country, this will be done on the basis of the European Commission's standard contractual clauses (SCC) with supplementary measures and in according with the legal requirements.

4. Information on the Retention Period of Personal Data

Personal data will be stored no longer than for the time strictly necessary to achieve the purposes indicated/ for a period not exceeding 1 year from (scheduled date) and in any case in order to comply with the Applicable Law (Artt.2946-2947). At the end of this period, the data shall be deleted or made anonymous.

5. Mandatory or Voluntary Communication of Data and Possible Consequences of a Failure to Provide it

The provision of personal data is voluntary, but refusal could interfere with the correct performance of the purposes, thus rendering the participation in the project impossible.

6. Automated decision-making processes

There are no automated decision-making processes that could produce an adverse legal effect on the data subject or have a similarly significant negative impact upon them.

7. The Data Subject's Rights

At any time, the data subject has the right to request access to their personal data, and to correct or delete that data, or to limit its processing. In addition, the right to lodge a complaint with a supervisory authority. When the data processing is based on consent, the data subject has the right to withdraw that consent at any time. The data subject may also exercise all other rights pursuant to current data protection regulations (art. 15 et seq. GDPR) by writing to the e-mail address: privacy@eurac.edu.

I. CONSENT to the processing of personal data

The Undersigned

_____

DECLARES to have read the Information about personal data handling and is aware of this notice as drawn up pursuant to UE Reg. 2016/679 and national legislation and CONSENTS to the processing of his/her personal data and in particular special categories of personal data (health data).

Place, date_____ Signature _____

II. PHOTOGRAPHING RECORDING AUTHORIZATION FORM

The undersigned authorizes hereby, according to art. 96 and 97 l. n. 633/1941 (Copyright law) Eurac Research (and any person acting under the authority of Eurac Research) to take photos and audio recordings (also group photos) of the undersigned during the test, in the framework of the project, which will take place in physical presence, and may be used, communicated, published and/or disseminated in any manner or media, including the use on web pages.

The undersigned hereby grants Eurac Research permission to use the photos and audio recordings free of charge for an unlimited period.

The undersigned declares that he/she will have no claims against Eurac Research with respect to the above and waives all rights, claims and/or actions arising out of the present authorization.

Place, date_____ Signature _____

Annex 2: Your Access Requirements

Here is an example of a form to be sent to participants before the meeting. The example is in English, but piloting partners are encouraged to translate it into their respective languages.

This form also applies when scheduling an individual interview.

n.b. Blind participants will be asked whether a family member or friend can assist them in completing the Access Requirements.

Please mark your answer. Please answer all the questions.

Name:

This section is about information, and how we communicate it to you.

Do you use Braille?

Yes No

Do you use Large Print?

Yes No

If yes, please indicate what font and size:

Write Answer Here:

For electronic documents what format do you require?

Write Answer Here:

Do you require information in any other formats?

Write Answer Here:

Do you require a Palantypist during the focus group?

Yes No

Do you need a Sign Language Interpreter?

Yes No

If yes, please indicate what language:

Write Answer Here:

Do you require a hearing loop?

Yes No

Do you need car parking space?

Yes No

Do you have any medical conditions that may require urgent attention during the focus group such as epilepsy, diabetes or allergies?

Write Answer Here:

Do you have any specific dietary requirements?

Write Answer Here:

Is there anything else we can do to help you feel included (for example regular breaks, somebody to talk you through meetings in advance etc.)?

Write Answer Here:

Do you use mobility aids such as a wheelchair?

Yes No

If yes, how much space is required for adequate clearance of your mobility aid through buildings and in rooms?

Write Answer Here:

Is there anything else we should know?

Write Answer Here:

Annex 3: Survey

Survey (to be administered 2 weeks before the Focus Group)

This section presents the structure of the survey. Each piloting partner may choose whether to administer the survey in paper format or through online platforms such as Google Drive or SurveyMonkey. The example provided refers to the Italian case. The first section (information Sheet and Consent Form) should be adapted to reflect the specific national context and the chosen method of administration. Text highlighted in grey indicates parts that should be modified accordingly for each country. If the survey is administered via an online platform, the Privacy Notice should be provided as a link, and the participant's consent is obtained by ticking both checkboxes included in the example. If the questionnaire is administered in paper form, a handwritten signature is required on the Privacy Note. Each piloting partner shall translate the survey into the language of their own country, and they will decide for the best strategy to administer the Survey.

If individual interview(s) are conducted, administer the survey 2 weeks before the interview as well.

Dear Participant,

We invite you to take part in a research project titled "EU LIFE ASSERT (Large-scale multiactor training and mentorship programme to ASSist people with physical impairments in energy povERTy" and funded by the European Commission (101167584). The research is conducted by the Institute of Renewable Energy at Eurac Research. Part 1 provides detailed information about the purpose and structure of the research project, allowing you to make an informed and voluntary decision about your participation. Part 2 covers the Information on data processing to be provided pursuant to Articles 13 and 14 of EU Regulation 2016/679.

Please review the following information carefully. The researchers involved in this project are available to answer any questions you may have.

Researcher(s) involved in the research project are:

Sana Fatima Ali, sanafatima.ali@eurac.edu

Francesco Babich, francesco.babich@eurac.edu

Annamaria Belleri, annamaria.belleri@eurac.edu

Giulia Torriani, giulia.torriani@eurac.edu

What is the purpose of this research project?

ASSERT focuses on addressing energy poverty by training policymakers, energy practitioners, and front-line workers to understand and respond to the needs of energy-poor households, particularly those with physical disabilities. These individuals face higher energy needs and lower incomes, making them more vulnerable to poor health conditions linked to energy poverty. The project will provide targeted training and mentorship, starting with a gap analysis, to ensure that local authorities, intermediaries, and energy-poor households can access energy-efficient solutions and participate in the clean energy transition. ASSERT aims to break the cycle of energy poverty by equipping key actors with the skills and knowledge to better support these communities.

One survey and one focus group and/or individual interview(s) are organized to understand energy needs, expected indoor comfort and energy practices of people with disabilities. The survey and focus group and/or individual interview(s) will process both personal data, which includes demographic information such as age and gender, and sensitive data, which include health-related information.

How will the research be carried out?

One focus group will be organized in (address/online platform) the (date and time). The expected number of participants are 10-20. If required, Individual interview(s) may also be held. During the focus group and/or individual interview(s), the researchers will gather a deep understanding of the energy needs, expected indoor comfort conditions, and energy

practices of individuals with disabilities experiencing energy poverty. In particular, the following topics will be discussed and recorded:

- Perceived and desired indoor conditions,
- Specific challenges faced during extreme weather conditions,
- Energy consumption (e.g., energy literacy and satisfaction with energy-saving solutions implemented),
- Financial, technological or physical barriers to energy access.

Additionally, participants will be required to fill out a questionnaire before the scheduled date for the focus group/ individual interview. The questionnaire will ask the following information:

- Socio-demographic data,
- Geographical and Climate Context,
- Energy consumption,
- Building characteristics,
- Energy practises.

The questionnaire will be implemented using SurveyMonkey and will be accessible via a link that will be sent via mail.

During the focus group and/or individual interview(s), participants will be asked to bring the latest energy bills with them. The focus group and/or individual interview(s) will be held in italian. The focus groups and/or individual interview(s) will be recorded and used only for research aims. Photos and Videos will be also taken. Data and quotes will be anonymized. Participants have the right to withdraw at any time both in the survey and in focus group and/or individual interview(s).

The questionnaire will be available in Italian only.

What will be expected from research participants?

Participants will need to fill out the questionnaire one week before the scheduled date for the focus group and/or individual interview(s). Participants will also need to actively participate in the discussion during the Focus Group and/or individual interview(s). Participants should bring their latest energy bills with them during the Focus Group and/or individual interview(s).

Before the focus group and/or individual interview(s), participants will be required to assess their access requirements via

- Participants should include individuals with physical disabilities
- Participants should belong to a vulnerable group facing challenges in accessing or affording energy for household needs.
- Participants should reside in one of the target countries of the project (Italy, Spain, Greece, France, Cyprus).
- Participants should have the opportunity to express their experiences, opinions, and needs in a written survey and in a group discussion setting, either independently or with the help of an assistant.
- Participants (or their legal representatives) must provide informed consent for participation in the survey and in the focus groups, in compliance with GDPR and ethical research guidelines.

How long does participation in the research project last?

Each participant will take part in the focus group/ individual interview for ...

How will the collected data be used?

Data collected will be processed through descriptive statistics and thematic analysis. The data may be shared with the national and international scientific community – in the form of scientific publications or project deliverables - in an anonymized format.

In order to safeguard personal data, each participant shall be assigned a unique identification code, which shall be solely accessible by Eurac for the purpose of correlating the identification code with the respective individual. The key linking the identification code to the participant's identity shall be securely stored in a password-protected file.

Privacy policy

☐ I DECLARE that I have understood the contents and objectives of the aforementioned project and that I voluntarily agree to participate in the project.

☐ I DECLARE that I have read and understood the privacy policy on personal data processing of Eurac Research pursuant to Regulation (EU) 2016/679 and I GIVE MY CONSENT to the processing of my personal data.

For any further information, please contact:

Giulia Torriani

giulia.torriani@eurac.edu

+39 0471 055964

Section 1: general information

Please, provide your unique participant ID:

What is your gender:

- Male
- Female
- Other
- Prefer not to say

What is your age?

- 18 or less
- 18-30
- 31-50
- 51-70
- Over 70
- Prefer not to say

What is your weight?

- 40 kg or less
- 41-60 kg
- 61-80 kg
- 81- 100 kg
- More than 100 kg
- Prefer not to say

What is your height?

- 150 cm or less
- 151- 170 cm
- 171-190 cm
- More than 190 cm
- Prefer not to say

What is the highest level of education you have completed?

- Less than primary education
- Primary education

- Lower secondary education
- Upper secondary education
- Bachelor's or equivalent
- Master's or equivalent
- Doctoral or equivalent
- Other (please, specify: ___)
- Prefer not to say

What type of disability do you have? (*Check all that apply*)

- Physical disability
- Visual impairment
- Hearing impairment
- Cognitive or intellectual disability
- Neurological condition
- Prefer not to say
- Other (please specify):

Do you have any other illnesses or health conditions?

- Yes
- No
- Prefer not to say

If yes, please specify (optional): __

What is your approximate monthly household income?

- Below €500
- €500 – €999
- €1,000 – €1,499
- €1,500 – €1,999
- €2,000 – €2,499
- €2,500 – €2,999
- €3,000 – €3,999
- €4,000 – €4,999
- €5,000+
- Prefer not to say

Do you receive any financial assistance or rely on support programmes?

- Yes
- No

If yes, please specify: _____

Do you live alone or with others?

- I live alone
- I live with family
- I live with a caregiver/assistant
- Other (please specify): __

How would you describe your level of autonomy in daily activities?

- Fully independent
- Need occasional assistance
- Need regular assistance
- Fully dependent on a caregiver

In which city do you live? _____

In which type of area do you live?

- Urban
- Semi-urban
- Rural

Do you experience extreme temperatures in your area?

- Yes, extreme cold in winter
- Yes, extreme heat in summer
- Yes, both extreme cold and heat
- No, temperatures are moderate throughout the year

Section 2: your dwelling *and home*

What type of dwelling do you live in?

- Single-family house
- Apartment in a multi-story building
- Shared housing (e.g., assisted living, group home)
- Other (please specify): ___

Do you know the approximate year your home was built? *

- Before 1950
- 1950 – 1979
- 1980 – 1999
- 2000 – 2010

- 2010 - 2020
- After 2020
- I don't know

**The time ranges can be amended for each country if there were specific landmark dates related to energy efficiency legislation.*

Does your home have any of the following energy-related characteristics? (*Check all that apply*)

- Good insulation (walls, floors, and roof)
- Double or triple-glazed windows
- Central heating system
- Air conditioning or cooling system
- High-efficiency appliances
- Smart home energy management system
- No insulation or poor insulation
- Old or inefficient heating system
- Drafty windows or doors (air infiltration)
- Visible mould or humidity issues
- I don't know
- Other (please, specify)

Do you use any renewable energy solutions at home? (*Check all that apply)*

- Rooftop solar panels

- Solar water heating system
- Heat pump
- Biomass or wood-based heating
- Energy-efficient appliances
- None of the above
- I don't know
- Other (please, specify) __

Does your house have an energy rating or certification?

- Yes (please specify the rating/certification): _
- No
- I don't know

What is the size of your home?

- Less than 30 m^2
- 30–59 m^2
- 60–89 m^2
- 90–119 m^2
- 120–149 m^2

- 150 m^2 or more
- I don't know

Section 3: energy consumption

What is your average monthly energy expenditure in winter?

	Below €50	€50 – €99	€100 – €149	€150 – €199	€200 – €299	€300+	I don't know	Prefer not to say	Not applicable
Electricity	☐	☐	☐	☐	☐	☐	☐	☐	☐
Natural gas	☐	☐	☐	☐	☐	☐	☐	☐	☐
Heating oil	☐	☐	☐	☐	☐	☐	☐	☐	☐
LPG (e.g. propane, butane)	☐	☐	☐	☐	☐	☐	☐	☐	☐

Wood (e.g. firewood, pellets)	☐	☐	☐	☐	☐	☐	☐	☐	☐
District heating	☐	☐	☐	☐	☐	☐	☐	☐	☐

What is your average monthly energy expenditure in summer?

	Below €50	€50 – €99	€100 – €149	€150 – €199	€200 – €299	€300+	I don't know	Prefer not to say	Not applicable
Electricity	☐	☐	☐	☐	☐	☐	☐	☐	☐
Natural gas	☐	☐	☐	☐	☐	☐	☐	☐	☐
Heating oil	☐	☐	☐	☐	☐	☐	☐	☐	☐
LPG (e.g. propane, butane)	☐	☐	☐	☐	☐	☐	☐	☐	☐

Wood (e.g. firewood, pellets)	☐	☐	☐	☐	☐	☐	☐	☐	☐
District heating	☐	☐	☐	☐	☐	☐	☐	☐	☐

Who is your energy provider? _

(KPI 1) **Can you afford to keep your home adequately warm in winter?**

- Yes
- No

Can you afford to keep your home adequately fresh in summer?

- Yes
- No

(KPI 2) **In the last twelve months, have you been in arrears, i.e., has been unable to pay on time due to financial difficulties for utility bills (heating, electricity, gas, water, etc.) for the main dwelling?**

- Yes

- No
- Prefer not to say

(KPI 3) **To what degree do you notice the presence of leaks, damp, or rot in your home?**

- Very much
- Somehow
- Somehow not
- Not al all

Section 4: energy practices

On average, how many hours per day do you stay at home?

- Less than 6 hours
- 7 – 10 hours
- 11 - 14 hours
- 15 - 18 hours
- 19 hours or more

Which of the following daily habits do you have related to energy use? (*Check all that apply*)

- I use heating during the winter
- I use air conditioning or fans during the summer
- I use energy-efficient lighting (e.g., LED bulbs)
- I cook using gas/electric stove, oven, or microwave
- I use a dishwasher or washing machine regularly
- I minimize appliance use to save energy
- I do not use any specific energy-saving practices

What are your preferred energy-saving measures or practices? (*Check all that apply*)

- Turning off lights and appliances when not in use
- Lowering heating or cooling settings during off-hours
- Using appliances with low energy consumption
- Installing smart thermostats or timers
- Insulating windows and doors
- Solar panels or renewable energy solutions
- Other (please specify):
- I do not engage in energy-saving behaviors

Can you provide any general information about your lifestyle or routine that could help estimate your energy consumption? (*Check all that apply*)

- I work from home
- I have a large household with many members
- I have specific medical equipment that requires energy use ☐ I have a significant number of electronic devices
- Other (please specify):

Do you require a specific temperature to be maintained in the home in relation to your disability?

- Yes
- No

If yes, please specify the temperature ranges:

(KPI 7) How often do you face difficulties in accessing public transport?

- every day
- once a week
- once a month
- never

Section 5: comfort

(KPI5, KPI6)

Are you generally satisfied with your dwelling's comfort?

- Very dissatisfied
- Dissatisfied
- Slightly dissatisfied

- Neither dissatisfied nor satisfied
- Slightly satisfied
- Satisfied
- Very satisfied

During summertime, are you generally satisfied with the temperature in your dwelling?

- Very dissatisfied
- Dissatisfied
- Slightly dissatisfied
- Neither dissatisfied nor satisfied
- Slightly satisfied
- Satisfied
- Very satisfied

During wintertime, are you generally satisfied with the temperature in your dwelling?

- Very dissatisfied
- Dissatisfied
- Slightly dissatisfied
- Neither dissatisfied nor satisfied

- Slightly satisfied
- Satisfied
- Very satisfied

Overall, are you satisfied with the air quality in your dwelling?

- Very dissatisfied
- Dissatisfied
- Slightly dissatisfied
- Neither dissatisfied nor satisfied
- Slightly satisfied
- Satisfied
- Very satisfied

Overall, are you satisfied with the air ventilation in your dwelling?

- Very dissatisfied
- Dissatisfied
- Slightly dissatisfied
- Neither dissatisfied nor satisfied
- Slightly satisfied

- Satisfied
- Very satisfied

(KPI 4)

Overall, are you satisfied with the level of natural light in your dwelling?

- Very dissatisfied
- Dissatisfied
- Slightly dissatisfied
- Neither dissatisfied nor satisfied
- Slightly satisfied
- Satisfied
- Very satisfied

Overall, are you satisfied with the level of artificial lighting in your dwelling?

- Very dissatisfied
- Dissatisfied
- Slightly dissatisfied
- Neither dissatisfied nor satisfied
- Slightly satisfied

- Satisfied
- Very satisfied

Overall, are you satisfied with the acoustic comfort in your dwelling?

- Very dissatisfied
- Dissatisfied
- Slightly dissatisfied
- Neither dissatisfied nor satisfied
- Slightly satisfied
- Satisfied
- Very satisfied

Section 6: Other

What do you expect from the discussion with other participants? _____

Annex 4: Printable templates for focus groups

Each piloting partner shall translate the templates into the language of their own country. (optional to have printable templates)

DISCUSSION 1 How comfortable do you feel with your energy use at home?					
Temperature and Humidity Levels	Air quality	Lighting Conditions	Acoustic conditions	Challenges in extreme weather	Your energy practices

DISCUSSION 2 What are the main barriers for you to access and use energy (or transport)?			
Financial barriers	Technology barriers	Physical barriers	Others

DISCUSSION 3 What support would you like to receive to make it easier for you to access and consume energy (and be mobile)?			
Financial aspects	Technology aspects	Physical aspects	Others

Annex 5: Questions for Individual Interview(s)

Each piloting partner shall translate the questions into the language of their own country. (optional to have printable questions)

Discussion 1 – indoor comfort

By indoor comfort we mean the feeling of well-being that one experiences in the indoor environments of the house, in relation to different factors such as temperature, air quality, light and noise.

These aspects can influence not only the level of comfort, but also health, the possibility of resting and of carrying out daily activities.

We would like to ask you how you perceive comfort in your dwelling and which strategies you use to maintain it.

1. To begin, how do you evaluate the temperature and the humidity in your house? Do you feel at ease?
2. Do you happen to feel too hot or too cold in the house? In which moments of the year and of the day and in which rooms do you perceive greater discomfort? What actions do you take in these cases to improve your comfort? Do you feel safe/independent and prepared in facing these moments?
3. How do you evaluate the air quality in the house? Do you use devices to improve it (e.g. purifiers, humidifiers)? Do you ever feel uncomfortable because of stale air, odors or lack of ventilation?
4. How do you find the lighting in the house? Is it easy to adjust it according to your needs? Do you feel comfortable with the natural and artificial light in the environments where you spend more time?
5. How do you evaluate the noise in the house? Do internal or external noises disturb your comfort? Does external noise affect the ways, the times of the day and the duration of opening the windows?
6. In general, how much do you feel at ease and competent in managing the internal conditions of the house and the energy consumed to maintain such conditions in the house?
7. Have you changed your habits or energy behaviours in the last years, for example to save energy or make the house more efficient?
8. Do you feel autonomous in managing the comfort of your dwelling? How much does the possibility (or impossibility) of regulating the environment affect your feeling of well-being and independence?

9. What are the main difficulties that you encounter in maintaining comfortable conditions in the house?
10. Is there something that you would change in your dwelling to improve your comfort?

Discussion 2 – Barriers to access and to the use of energy or of transport systems

1. Are you able to directly regulate windows, curtains, heating/cooling and lights, or do you need help?
2. Has it ever happened to you to give up opening a window or regulating a system because it was not accessible or too complicated to use?
3. Do you use technologies or aids (for example remote controls, apps, home automation systems) to manage comfort and systems?
4. Which personal measures do you use to feel more at ease (e.g. clothing, moving from room to room, using portable fans)?
5. Are there difficulties that you encounter in the use of energy in the house or in mobility?
6. Are there financial obstacles that limit your choices? Are there technological obstacles (e.g.: devices complex to use)? Are there physical obstacles (e.g.: accessibility problems)?
7. Do other types of obstacles exist that you consider relevant, such as bureaucratic problems, lack of information or technical support?
8. How do you normally face these obstacles? Have you found strategies or solutions to overcome them?

Do you have systems of use of energy from renewable sources (heat pump, PV panel, solar panel.)? Would you be interested in evaluating the installation of such solutions in your house? Which do you think could be the barriers (e.g. economic, access, knowledge, other)?

Discussion 3 – Desired support

1. What type of support would you like to receive to make it easier to access and use energy in the house or to move more easily?
2. Do you consider financial support useful, such as incentives or facilitations?

3. Do you consider technological support useful, such as simpler devices or technical assistance?
4. Do you consider physical support useful, such as adaptations of the house or tools for mobility?
5. Are there other types of support that would be useful to you? Which of these supports do you think would be most useful to increase your comfort and autonomy in the use of energy and of mobility?

Annex 6: Reporting document structure

This section presents the reporting document structure that each piloting partner should align with when presenting the analysis of data collected from the focus groups and/or individual interview(s) and the survey. Eurac Research may provide help in the reporting phase, if needed. Furthermore, Eurac Research will compare and summarize the results.

Reporting note: Indicate whether data were collected via a focus group or via individual interviews

1. Introduction

Please, provide the research objectives, clearly stating the purpose of the study. Describe what you aimed to achieve through the survey and focus group and/or individual interview(s), highlighting the main insights you were seeking, such as understanding the energy needs, comfort conditions, and energy practices of people with disabilities experiencing energy poverty.

2. Methodology

Number and description of participants, data collection, place and date, thematic analysis etc.

3. Results

3.1 Survey results

Descriptive statistics of the survey questions.

3.2. Description of Main Themes

For each theme identified through the thematic analysis, provide a theme name that is clear and descriptive. Then, offer a detailed description of the theme, explaining its significance within the context of the study. For example, if one theme relates to

economic barriers, describe how participants mentioned limited financial resources and the effects this has on their energy choices. Under this section, include examples from the raw data—provide specific quotes or paraphrased statements from participants that illustrate the theme. These examples should be presented in a way that directly connects the data to the theme you are discussing. Repeat this process for each identified theme.

3.3. Relationships Between Themes and Possible Explanations

In this section, describe any interconnections between the themes. Discuss how different themes may be linked or influence one another. For instance, you might find that economic barriers (such as the inability to afford heating) directly impact thermal comfort, with participants describing how they adjust their daily routines or living conditions to conserve energy. Afterwards, explore possible explanations and insights based on your data. Reflect on why these relationships exist and what they reveal about the experiences of participants, providing a deeper understanding of the factors that contribute to energy-related challenges faced by people with disabilities in energy poverty.

4. Conclusions

This section will summarize the key findings from your analysis, offering a clear overview of the major themes and insights. Reflect on any overarching patterns or commonalities that emerged from the data, such as consistent challenges related to energy use or widespread strategies for coping with inadequate heating. If applicable, include recommendations based on your findings. These could be directed at policy changes, support programs, or strategies to improve access to energy solutions for people with disabilities in energy poverty. Lastly, offer suggestions for training materials, outlining how your findings could inform the creation of content aimed at raising awareness or providing resources for those facing similar challenges.

6.2. Individual Reports from Pilot Partners

6.2.1 Cyprus

A. Report for ASSERT Focus Group with persons with Disabilities in Cyprus

A.1 Introduction

The objective of the Focus Group was to facilitate a face-to-face dialogue with persons with disabilities— ideally representing a range of disabilities—in order to gain valuable insights into:

- Their household experiences throughout the year, including perceived and desired indoor environmental conditions
- Specific challenges encountered during extreme weather events, particularly in relation to their individual disabilities
- Their energy consumption patterns and practices, including levels of energy literacy and satisfaction with any energy-saving solutions implemented
- The economic, technological, and physical barriers they face in accessing energy—not only within their households, but also in public transportation, public spaces, and public buildings

Invitations were extended to a diversity of organizations and groups, with the aim of ensuring the participation of individuals with different disabilities through discussion and an anonymous survey. The goal was to collect multilayered data that highlights the need for tailored support measures and a deeper understanding of the everyday energy needs of people with disabilities. Additionally, the focus group explored the self-organized strategies and coping mechanisms developed by these communities to adapt to energy-related challenges.

Furthermore, the session aimed to assess the state's readiness to meet these specific needs. Key areas of evaluation included energy retrofit and financial support, public infrastructure design, comfort and indoor climate conditions, as well as the overall accessibility of the built environment and the existing building stock. The results of the Focus Group will inform policymaking and propose inclusive policy measures.

A.2 Methodology

The focus group took place at the University of Cyprus campus in Nicosia on the 12th of September from 17:00-19:00. The choice of space for the venue followed the accessibility criteria provided via the T.2.2. Toolkit for conducting Focus Groups with People with Disabilities.

The aim was for 10-20 participants representing at least two different groups of persons with disabilities in order to gather richer insights and to allow participants themselves to reflect and learn from the experiences of other groups.

The session began with an introduction on the Cyprus Energy Agency and the ASSERT project. Then, the participants filled in the Policy Note and the GDPR Consent form. Moreover, the main part of the Focus Group was concentrated on the Discussion following the 3 Discussion templates provided in the annexes of the T.2.2. Toolkit for conducting Focus Groups with People with Disabilities. The facilitators took notes during the discussion.

DISCUSSION 1: How comfortable do you feel in your home? How do you perceive your energy consumption?

- Temperature and Humidity levels
- Air Quality
- Lighting Conditions
- Acoustic Conditions
- Challenges related to extreme weather events
- Energy practices

DISCUSSION 2: What are the main challenges for you to access and use energy (or transport)?

- Financial challenges
- Technological challenges
- Physical barriers
- Other

DISCUSSION 3: What support would you like to receive to make it easier for you to access and consume energy?

- Financial aspects
- Technological aspects
- Physical aspects
- Other

Lastly, the participants filled in the printed form of the Survey on the Energy Needs of People with Disabilities in Cyprus.

The notes from the discussion were transferred to an online document and the responses to the survey were transferred to the digital versions of the survey for easier data processing.

A.3 Results

A.3.1 Survey Results

Five (5) participants attended the Focus Group: four (4) people with hearing impairment (accompanied by a sign language interpreter) and one (1) person with a mobility disability who uses a wheelchair. Four participants identified as female and belonged to the 31–50 age group, while one participant identified as non-binary and belonged to the 18–30 age group.

In terms of body weight, one person weighs 40 kg or less, one between 41–60 kg, one between 61–80 kg, one between 81–100 kg, and one weighs more than 100 kg. All participants have a height between 1.51 m and 1.70 m. Two participants reported having no other health-related issues beyond their disability, two preferred not to disclose, and one did not answer the question.

Regarding education, two participants have completed high school (lyceum level in Cyprus), one holds a bachelor's degree, one holds a master's degree, and one did not specify their highest level of education.

In terms of average monthly household income, one person reported earning less than €500 and another between €500–999, both falling below the minimum wage. The remaining three participants reported higher income levels: two between €1,000–1,499 and one between €2,000–2,499. However, household size was

not provided, though three out of five participants mentioned that they live with their families. Three participants also reported receiving some form of financial state aid (e.g., for a domestic carer or helper).

Three participants reported feeling completely independent and autonomous in their daily lives, while two stated that they occasionally require minor assistance. Two participants work outside the home and spend less than six hours per day at home, while the remaining three spend more than 11 hours per day in their homes.

All participants reside in the Nicosia area, the capital of Cyprus. Three live in suburban areas and two in urban neighborhoods. Housing types vary: three participants live in detached houses, one in an apartment building, and one in shared accommodation (student dormitory). Building construction periods also differ: two homes were built during the 1980–1999 construction boom, one between

1950–1979, one between 2008–2017, and one participant did not know the construction date. Home sizes range from 60–89 m² to over 150 m².

Participants reported diverse experiences with extreme weather conditions. Two out of five mentioned extremely hot summers, one reported extreme cold in winter, one reported both extreme heat and cold, and one stated that temperatures are moderate throughout the year. Two participants reported indoor quality issues such as leaks, moisture, or mold.

Regarding energy efficiency, positively reported features included good insulation of walls, floors, and roofs (2 mentions), double or triple glazing (2 mentions), and a central heating system (1 mention). Conversely, two participants each reported poor or no insulation, an old or inefficient heating system, airleaking window frames, and visible mold or moisture problems. Renewable energy use was common: three participants use solar water heaters, and one also has installed photovoltaic panels. Only one participant reported that their home has an Energy Efficiency Certificate.

Electricity is the most significant winter expense for participants. Three spend €100–149 per month on electricity, one spends €200–299, and one spends less than €50. Heating oil costs reach €200–299 for two participants and €150–199 for another two. Two participants use firewood for heating—one spending €50– 99 and the other €150–199 per winter. Two also use LPG (propane or butane) for heating, both spending less than €50 per winter.

In summer, electricity remains the main energy expense. Two participants spend €200–299 per month, two spend €150–199, and one spends €50–99. That same person also reported spending a similar amount on LPG. Four participants stated that they cannot afford their winter energy costs, while summer expenses are more manageable: two reported being able to afford them, and two reported delayed bill payments in the past year.

All participants use air conditioning and/or fans to cool their homes in summer. Most (4 out of 5) use energy-efficient lighting (LED) and washing machines regularly. Three participants use heating during winter, and three use cooking appliances—suggesting that the remaining two may not cook themselves or depend on others for meals.

Two participants reported consciously reducing appliance use to lower energy consumption and bills. Common energy-saving behaviors included using energy-efficient appliances and adjusting heating/cooling temperatures when away from home. Three participants also turn off lights and unplug devices when not in use. Additional efficiency measures (reported by 2 participants) include window and door insulation and the use of solar water heaters or photovoltaic systems. One participant has installed smart thermostats or timers.

When asked about factors affecting their energy use, one participant mentioned using energy-intensive medical equipment and owning many electronic devices. Another participant also reported having numerous electronic devices, while one explained that working from home requires continuous use of household appliances.

The wheelchair user indicated that maintaining a stable indoor temperature is essential for health reasons related to her disability. Participants who are deaf or hard of hearing did not report any disability related temperature needs.

Transport poverty emerged as an issue. Two participants experience daily difficulties accessing public transport, and one faces such difficulties about once a month. The other two reported no problems; however, during discussion it was revealed that public transport is often not considered a safe mobility option, which may render these responses misleading.

Participants expressed diverse views on home comfort. During summer, two were dissatisfied with indoor temperature, one very dissatisfied, one satisfied, and one neutral. In winter, two were dissatisfied, two slightly dissatisfied, and one satisfied.

Most participants (4 out of 5) had a neutral opinion about indoor air quality and ventilation, while one was dissatisfied.

Lighting conditions received mixed feedback. Two participants were satisfied with natural lighting, while one was neutral, one slightly dissatisfied, and one very dissatisfied. Opinions on artificial lighting varied even more widely, ranging from very satisfied to very dissatisfied.

Acoustics were not assessed by some participants (as they are deaf). Among those who responded, opinions were either neutral or dissatisfied.

A.3.2 Description of Main Themes

Discussion 1 on energy consumption and thermal comfort:

1. Temperature & Humidity:

The theme of temperature and humidity has become very important in the context of Cypriot households with the increase of heatwaves and other extreme events. During the summer, participants reported that their homes become excessively hot, making it difficult to sleep and requiring constant use of air conditioning. Some people depend on AC for health reasons (e.g., due to itching or medical procedures such as catheterization). Achieving thermal comfort is a major challenge for some people with disabilities, and this is directly linked to their condition. However, participants also shared that their use of AC is often limited due to the high cost of electricity, which negatively affects their quality of life.

2. Air Quality:

Air quality levels have deteriorated in recent years in Cyprus due to the increase of dust phenomena from the Sahara Desert and local air pollution. While there are some means of monitoring air quality (such as sensors), individual needs vary significantly. One participant shared that she has no sense of smell and therefore cannot perceive dangerous odours, which increases the risk of accidents both at home and outside. Another participant with a mobility disability (using a wheelchair) explained that in her previous home, which was old with smelly furniture, she could not easily reach the windows to ventilate the rooms.

3. Lighting:

As most of the Focus Group participants had hearing impairments, the discussion highlighted the importance of good lighting for deaf people who rely on visual communication (e.g., sign language). Adaptations are necessary in households for people with hearing impairments so that notifications and signals from devices are delivered through light and/or vibrations instead of sound. Furthermore, the participant with a mobility disability shared her difficulty in accessing light switches, which resulted in dependence on third parties.

4. Acoustics & Notifications for deaf and hearing impaired:

This theme was predominant in the discussion since most of the participants were deaf or hard of hearing. Audible notifications are commonly used in product and appliance design (e.g., baby monitors, household devices), but these do not meet the needs of this group. Deaf and hard-of-hearing people often need to search for alternative devices, but options using light or vibration are limited. This gap affects their safety, autonomy, and daily functioning at home.

5. Challenges during Extreme Weather Phenomena:

Participants mentioned that they are generally excluded from planning and response strategies related to extreme events. The current notification infrastructure for emergencies (earthquakes, heatwaves, war sirens) does not take into account the needs of people with disabilities, especially the deaf. Some participants explained how they had created individual adaptations in their homes (e.g., light alerts or whistles) to communicate with their families in emergencies. Heatwaves are the most common extreme weather phenomenon in Cyprus, and the participant with a mobility disability explained how self-care activities (such as

bathing) become more demanding for people with mobility difficulties during such events.

6. Energy Practices & Safety:

Throughout the session, participants shared examples of how they adapt their homes to their needs and how they adjust their lifestyle according to their capacities and resources.

One participant explained: *"I spend many hours indoors but limit the use of basic appliances (such as AC) because high energy consumption means high costs."*

Safety is also a major concern, particularly for those who cannot perceive smells or sounds. People with disabilities make efforts to enhance safety and accessibility through automation and home adaptations. For example, deaf people install vibrating doorbells, while a person with no sense of smell may install sensors or choose electric stoves instead of LPG, which carries a risk of leaks.

Discussion 2 on challenges in accessing and using energy:

1. Economic challenges:

Participants first shared the difficulties they face with the high cost of housing. Rents are unaffordable, while the benefits that some persons with disabilities receive are insufficient. In addition, the expenses related to adaptations and necessary modifications to the home (e.g., accessibility adjustments, specialized equipment) make accessible housing financially unaffordable.

Many persons with disabilities also pointed out the social isolation they experience due to the lack of access to employment. They highlighted the challenges in finding jobs that meet both their needs and their skills.

Another common challenge that emerged was the lack of information and, at times, lack of access to state benefits. Many persons with disabilities are unaware of available grants or procedures, often due to limited or poorly targeted support. Participants shared that it is difficult to benefit from these grants, as they require initial capital, payments are often delayed, and suppliers or installers tend to avoid direct cooperation with the state.

Participants also noted that grant procedures lack flexibility and do not allow for sufficient personalization. The specific needs associated with different types of disabilities are not adequately taken into account.

Finally, participants expressed their disappointment about what they described as a "forced dependence on cars." *As one participant explained: "Public transport is*

unreliable or inaccessible, making the car a necessary but expensive means of transport."

2. Technological challenges:

Many systems in the built environment remain inaccessible and lack universal design to address diverse needs. For example, deaf participants highlighted the absence of visual alerts in elevators, public transport, and the road network. Most elevators provide only audible alerts, and there are no camera systems to allow deaf people to call for help. As a result, deaf individuals often feel the need to move around with others for safety, which undermines their autonomy.

Beyond the issue of danger notifications, there is also a widespread absence of both digital and physical information in many indoor and outdoor spaces, making wayfinding a complicated task. Public transport lacks real-time information, clear signage, and guidance systems. This problem, combined with the lack of infrastructure for alternative transportation such as safe bike lanes and accessible pavements, makes traffic particularly dangerous for persons with disabilities. These challenges affect people with a range of disabilities, whether they cannot perceive audible signals, have vision impairments, mobility difficulties, or other conditions.

Participants also identified a technological barrier linked to bureaucracy. Application processes for support are often time-consuming and inaccessible.

Finally, participants described the daily struggle of dealing with inappropriate household appliances. One participant noted the prevalence of non-ergonomic products: "*High refrigerators, but also other appliances and furniture are not suitable for wheelchair users. And not only people with mobility disabilities need other models — people with dwarfism or even children need a shorter option*." A deaf participant also explained that the device models subsidised by the government are technologically inadequate to meet the communication and daily-use needs of people with hearing disabilities.

3. Physical barriers (space & access):

As described in the Economic Challenges section above, housing designs are often inaccessible to persons with disabilities, with narrow spaces, difficult access to windows, and inadequate lighting and ventilation. This creates a significant barrier to finding homes that are accessible, functional, and comfortable. The same challenges are present in public buildings and spaces, where infrastructure is frequently inadequate, for example, ramps with incorrect gradients, poorly designed sidewalks, and insufficient crossing times at traffic lights.

Another barrier, already touched upon in the section on Technological Challenges, is the lack of homebased or online services. This gap intensifies the difficulties faced by persons with disabilities, who are often required to be physically present in public services, making procedures more complicated and less accessible.

Participants also expressed concerns about the absence of disability-inclusive emergency planning. There is no clear mapping of safe places or evacuation and support plans tailored to the needs of people with disabilities. One participant with a hearing disability explained: *"I always choose to use the stairs in the apartment building where I live, instead of the elevator. I am afraid that if something happens, I will not be able to communicate with anyone. There is only the option to call, but I cannot hear or speak — so how would I communicate if there's a connection issue and I can't even make a video call?"*

Finally, participants stressed the need for specialized training for professionals responsible for housing adaptations for persons with disabilities. Since different types of disabilities come with different requirements, proper expertise is essential. One wheelchair user explained: *"The understanding and knowledge of contractors who make these adaptations is insufficient; they are not qualified. On the other side, we are not institutionally supported to provide guidelines to them. The burden falls on the individual with disabilities or their family."*

4. **Social/organizational challenges:**

Participants spoke about a bureaucratic "ping-pong" that has a major impact on the lives of persons with disabilities, who are often sent from one service to another without coordination.

They also highlighted a general lack of information and guidance for both people with disabilities and their families. There is no central body that adequately informs them about their rights, available equipment, or forms of assistance. As a result, when it comes to choosing technological equipment, individuals are left to make decisions on their own, without proper guidance or specialized support.

Discussion 3 on the support they would like to receive to make energy access and consumption easier

1. **Financial aspects:**

Participants of the focus group called for a simplification and overall improvement of the grant process. They suggested that grants should be paid directly to suppliers or installers for the purchase of equipment and devices.

2. Technological aspects:

Deaf participants highlighted that access to basic technological equipment (such as mobile phones, tablets, computers, and printers) through grants or discounts is essential for communication and inclusion within the hearing-impaired community.

A participant using a wheelchair noted that accessible spaces with easy access to switches, along with the wider adoption of universal design, would significantly improve autonomy and the quality of everyday life.

Participants also emphasized the importance of improving notification mechanisms in emergency situations. Measures such as SMS alerts, TV announcements, sign language interpretation, and video call options would enhance both safety and the sense of belonging within the community.

Other suggested technological improvements concerned household appliances and equipment. Examples included:

1. Alternative solutions for notifications (e.g., smoke detectors) that currently rely only on sound.
2. Smart meters for leak detection.
3. Greater integration of automation features in home appliances to improve safety.

3. Physical aspects:

To improve the accessibility of households for persons with disabilities, it is important to standardize the provision of safety instructions and specifications by relevant operators. This could include, for example, recommendations for personal safety equipment such as an earthquake whistle. In addition, a comprehensive mapping and recording of the needs of persons with disabilities would enable more targeted support during emergencies.

Focus Group participants also emphasized the need for a more inclusive design of the urban and built environment. This includes separated sidewalks and cycle lanes away from cars, improved public bus stops, and longer crossing times at traffic lights. Furthermore, inclusive signage and real-time information in public spaces can reduce barriers for persons with different disabilities and provide greater opportunities for independence.

4. Other aspects:

Participants emphasized the importance of home visits by social workers and other government personnel to provide personalized support, such as assessing the living space and equipment.

They also highlighted that, depending on the type of disability, early warning systems for persons with disabilities must be specialized and diversified. It is essential to provide multiple means of warning and communication to ensure safety for all.

Given that financial challenges linked to disabilities can affect employability, participants stressed that the government should support the creation of employment opportunities in accessible and appropriately designed workplaces.

Finally, participants noted that awareness-raising efforts should also include education and information for relatives and caregivers, to foster a better understanding of the needs of persons with disabilities.

A.3.3 Relationships Between Themes and Possible Explanations

An obvious interconnection between the Economic barriers and Thermal comfort & energy use arose from the three discussions of the Focus Group. The high cost of electricity and maintenance prevent participants from using AC or other appliances, even when essential for their health. This directly impacts their thermal comfort and increases their vulnerability during heatwaves, as well as the risks for coping strategies for everyday tasks. The financial complexities of inaccessible housing (high rents, costly modifications) cause a feeling of “trap” for the participants who live in poorly designed homes that are less energy efficient.

There is also an interrelation between the technological barriers and the level of safety and autonomy experienced by persons with disabilities. For the deaf participants, the absence of visual/vibration-based alerts in appliances, elevators, and public spaces forces them to rely on others for safety, undermining their autonomy. Moreover, inadequate or non-ergonomic household appliances affect mobility-impaired participants, reducing their independence in completing simple everyday tasks.

The equipment which is subsidised by the government is often outdated or misaligned with actual needs (especially for the persons with hearing impairments), which is an example of how technological barriers combined with bureaucratic/organisational challenges can deteriorate the autonomy and independence of persons with disabilities.

The correlation between the physical barriers (which are perceived as barriers only to persons who are not able-bodied) and the energy vulnerability validates the need for conducting this focus group. Housing, which is inaccessible or inadequate for someone who has disabilities (e.g., narrow spaces, poor ventilation, difficulty opening windows) worsens the conditions for achieving thermal comfort. Similarly,

poorly designed infrastructure (ramps, sidewalks, traffic lights) not only restricts mobility but also contributes to forced car dependence, creating additional financial burdens. Also, the challenges with physical space are directly linked to safety risks during extreme weather or crises and the gaps in emergency planning and the lack of inclusive evacuation strategies increase the vulnerability of persons with disability.

Another interconnection that is revealed through the data collected is the one between social/organisational barriers faced by people with disability and the access to resources. Bureaucratic processes and the lack of centralised information prevent participants from accessing grants, benefits, or appropriate equipment, which perpetuates economic challenges, worsens energy poverty and sustains unsafe living conditions. The burden of disability-specific housing adaptations is shifted on families and individuals, due to the lack of trained professionals and this illustrates how institutional weaknesses can reinforce both financial and physical barriers.

Many of the requests for improved support that were discussed among the participants such as simplified grant procedures, direct supplier payments, universal design of spaces, improved emergency notifications, social worker home visits) are a direct response to the mapping of barriers they described earlier. map directly onto the barriers participants described earlier. This shows that participants' suggested solutions are practical responses to very concrete gaps in their everyday lives.

Insights from the above interconnections between themes and the phenomenon of Energy Poverty in Persons with Disability.

Participants' inability to afford cooling, heating, or energy-efficient housing makes them disproportionately vulnerable to heatwaves, poor air quality, and other climate-related risks. Also, inaccessible design (appliances, housing, transport) creates a cycle of dependence linking economic, physical, and technological barriers which limit employability, income and reinforcing financial vulnerability.

The lack of a central, well-coordinated system means that people with disabilities must navigate fragmented public services and bureaucracy alone, often without guidance. This leaves them excluded from benefits and reinforces feelings of neglect and mistrust toward institutions.

Participants adapt by using whistles, light-based systems, or avoiding elevators, but these are individual, improvised solutions. They reveal both the creativity and the resilience of participants and the absence of structural support. Reliance on such personal coping strategies highlights systemic inequality compared to the general population, who can rely on standard systems for safety and comfort.

An important insight from the Focus Group discussion is the intersectional nature of Energy poverty. The discussions show that energy-related challenges are not just about electricity costs. They intersect with disability, housing, infrastructure, technology, and governance.

A.4 Conclusions

Persons with disabilities in Cyprus face significant challenges in their homes that are directly related to their energy needs, safety and accessibility. The solutions implemented are largely fragmented and based on individual initiative.

The main challenges identified were the insufficient financial support and access to funds/grants, the lack of offer of personalised and coordinated solutions by the state, the design flaws of technological appliances and physical space, the systemic exclusion of persons with disability (bureaucracy and lack of participation in policy/decision making) and their needs.

The Focus Group discussion provided insights that show there is a need for:

- Integrated, accessible and economically viable energy solutions for households with persons with disabilities
- Specially adapted public infrastructure that takes into account different types of disability.
- Public policy and technological support to ensure energy, justice and the quality of life of people with disabilities.

B. Report for ASSERT Interviews with carers and professionals of the SMILE Project of the Autism Support Famagusta

B1. Introduction

The interview with professional and volunteer staff and carers of the SMILE Project (Autism Support Famagusta) aimed to gain qualitative insights into the everyday experiences and environmental needs of persons with autism within the centre's premises. Specifically, the discussion focused on:

- The perceived and desired indoor environmental conditions throughout the year during the time spent in the SMILE Project premises
- Challenges encountered during extreme weather events, considering each individual's disability.

- Energy consumption patterns and practices, levels of energy literacy, and satisfaction with energy-saving measures (from the perspective of the staff)
- Economic, technological, and physical barriers in providing adequate support to persons with autism

The goal was to collect qualitative data that highlights the need for tailored support measures and a deeper understanding of the everyday energy needs of people within the autism spectrum.

Furthermore, the session aimed to assess the state's readiness to meet the specific comfort and accessibility needs of people on the autism spectrum.

Findings from this consultation inform the design of inclusive policy measures for energy retrofit, comfort, and accessibility improvements in disability care facilities.

B2. Methodology

The interview took place at the SMILE Project premises in Sotira on 22 September, from 11:00 to 12:00. The purpose was to meet the staff within their working environment in order to gain richer, context-based insights and to allow the researchers to experience the space first-hand.

The interview discussion involved four participants including the President / Project Coordinator of the Smile Project, the social worker that supports the centre, a consultant expert who visits the centre a couple of times per year, a volunteer of the project and several carers. The session began

with a brief introduction to the Cyprus Energy Agency and the ASSERT Project, followed by the completion of the Policy Note and GDPR Consent Form by participants. The main part of the session consisted of an unstructured interview, during which facilitators took detailed notes to capture the discussion.

As persons on the autism spectrum are generally unable to articulate perceptions of energy efficiency or thermal comfort due to the nature of their disability, the interview was conducted with the professional and volunteer staff, as well as carers of the centre, who were able to provide informed perspectives based on their daily experience supporting residents.

B3. Results

The Autism Support Famagusta Association was founded in 2013 with the purpose of supporting both local and international autism communities, including autistic individuals and their families. This mission is being advanced through the

implementation of Project SMILE, which combines autism expertise with innovative approaches to care and education.

Project SMILE involves the establishment of an Autism Centre in Ayia Napa, Cyprus, designed to host, support, and educate both individuals on the autism spectrum and their parents.

At present, the SMILE Project operates in an older building in Sotira, where seven individuals receive daytime care provided by a team of seven to eight carers and professionals. The centre does not offer overnight accommodation. However, staff observation plays a central role in assessing each person's comfort, behaviour, and environmental needs.

The interview conducted at the centre yielded qualitative and factual data organised into four key thematic areas:

1. The physical environment and building conditions of the SMILE Project
2. Sensory and safety considerations for individuals on the autism spectrum
3. Behavioural and individual needs of residents
4. Future planning and funding prospects

1. The physical environment of the SMILE Project and the Building conditions

The existing building, dating from the 1970s, is old and thermally inefficient, with roof waterproofing problems and outdated air conditioning units. The windows are double-glazed but lack thermal breaks;

however, shutters on all sides allow for the regulation of direct sunlight. The premises include an auxiliary building and an additional prefabricated unit connected by a sheltered outdoor space, which, despite providing shade, lacks greenery.

The staff reported that a local business had offered to install photovoltaic (PV) panels free of charge, but the implementation was delayed due to administrative complications — including outdated property documents, unclear title deeds, and an ongoing boundary dispute with the neighbouring plot.

Given that the organisation is expected to relocate within the next two to three years to a new, purpose-built facility in Ayia Napa, staff are seeking cost-effective interim improvements to the current premises. Among the potential short-term solutions discussed were the installation of thermal roof insulation and external wall insulation in rooms most affected by difficulties in maintaining comfortable indoor temperatures. Short-term fixes are necessary to compensate for the current limitations of the old building, but long-term planning focuses on a fully adaptable facility with energy efficiency and safe environmental conditions for the persons with autism.

2. Sensory and safety considerations for individuals on the autism spectrum

The centre features a sensory and de-escalation room, developed at a cost of approximately €40,000, which includes soundproofing and an advanced light and sound projection system. Given the heigh sound sensitivity of individuals with autism, maintaining a calm and acoustically controlled environment is essential for their well-being, making soundproof walls a critical design requirement.

Lighting conditions are equally important. To ensure sensory comfort and prevent photosensitive epilepsy triggers, dim or spot lighting is recommended, while fluorescent lights are strictly avoided due to their flickering and intensity.

All furniture and electrical appliances should be both flexible and lockable, allowing for safe adaptation to individual behavioural needs — for example, in cases such as Prader–Willi Syndrome, where access to food must be controlled. In addition, the selection of materials and fittings (such as window frames and curtains) requires careful consideration to ensure both safety and sensory balance.

Finally, spatial design must aim to prevent the trigger of harmful or obsessive behaviours. This includes avoiding washbasins in individual rooms and rounding wall corners, which can reduce the risk of self-harm and enhance overall safety.

The future building for the SMILE Project should have centralised environmental controls (temperature, lighting) rather than individual room controls.

3. Behavioural and individual needs of residents

Individuals on the autism spectrum often struggle to express their thermal comfort levels (e.g., feeling too hot or cold), either due to communication challenges or cognitive limitations associated with their condition. As a result, the SMILE Project staff rely on behavioural observation and sensory assessments to identify each person's comfort thresholds and environmental needs.

There is considerable variation among individuals in the spectrum, making personalised environmental adaptations both essential and challenging to implement. In this context, occupational therapists play a vital role by providing specialised guidance and ad hoc solutions that enhance comfort, safety, and overall well-being.

4. Future planning and funding prospects

The Deputy Ministry of Social Welfare will provide funding for the new facility building in Ayia Napa if it is included in the new budget planning period

B4. Conclusions

The SMILE Centre faces a range of energy-related challenges typical of older buildings. These include inadequate insulation, outdated air conditioning systems, and a limited sensory-friendly design that affects both energy performance and user comfort.

Environmental and sensory modifications are essential to ensure the comfort, safety, and well-being of residents—particularly as many are unable to communicate or perceive discomfort directly. Given the wide diversity of needs across the autism spectrum, individualised adaptations are crucial. In this context, occupational therapists and attentive carers play a key role in translating environmental features into effective and responsive forms of support.

In the short term, targeted interventions such as thermal insulation and other temporary adjustments are being considered while the staff work to secure funding for a new facility. The SMILE Project already has architectural designs for this future centre, which prioritise sensory-friendly, safe, and adaptable environments. The new design will include soundproofing, flexible furnishings, and centralised environmental controls, developed with professional input to create tailored sensory environments that accommodate the diverse needs of individuals with autism and cognitive disabilities.

6.2.2 France

Reporting document WP2 focus groups France

1. Introduction

The Enercoop team sought to meet with people with disabilities to understand their specific energy consumption needs and identify the difficulties they face, in order to determine which topics to cover in the ASSERT training courses. Conversations took place in small groups, which facilitated direct exchanges. A safety framework was reiterated at the beginning of each focus group (recalling the GDPR rules, the aim of the research which is non-judgmental, with everyone speaking for themselves and the degree of sharing being defined by each participant) and clear, themed questions were then asked. The project team facilitated these discussions by giving each participant a turn to speak, allowing them to express their views and add to the comments made by other participants.

2. Methodology

The Enercoop team conducted **three focus groups: one in person in Paris on 2 September with three people, and two online with four people (on 24 September) and three people (on 1 October)**. The discussion template from the focus group toolkit was used, except for the online focus group with four people, where the project team used the individual interview template to test a more guided and direct interview format. Fourteen responses to the online questionnaires were also collected, including responses from participants who did not take part in the focus groups.

For the first two focus groups, which lasted two hours, the team did not cover theme 3, 'desired support,' due to lack of time, as the discussions were lengthy.

The respondents told us about their various disabilities, such as sickle cell anemia, regular and severe migraines, almost total blindness, neuromuscular and degenerative disease, 80% disability, and a highly dependent person.

3. Results

3.1 Survey results

We received **14 answers to the survey**. The majority of respondents are women, people living alone and in the urban area of Paris. Most of the respondents are between 31 and 70.

Disabilities reported are mainly physical disabilities, and about half of the respondents also reported other troubles like visual impairment or neurological disorders.

3.2 Description of Main Themes

Issues related to temperature

It is sometimes **impossible for people to regulate the temperature in their homes**—either because the heating system is shared or because it is too expensive to increase the heat. Coping with cold or heat can be especially difficult for people with chronic illnesses, so individual solutions must often be found: insulating the body, choosing which room to live and heat, or using additional heating sources.

4 respondents out of 14 are not able to heat their homes during winter time.

In some homes, installing an **air conditioning system is physically impossible, even when it is clearly needed**. For respondents with chronic conditions, there is often a significant difference between the measured temperature and how it is actually felt **(thermical comfort)**.

Some participants live in buildings where the temperature is kept higher to accommodate elderly residents, which partly helps address the issue.

One respondent indicated that he/she was heating at 15 or 16°C in winter and wearing a pullover and socks in order to avoid high energy expenses.

One participant, unable to move due to her condition, is often very cold and must keep the heating at maximum. Her **mornings are reserved for medical care, so she needs to heat her bedroom**. She must also increase the stove temperature to be able to use her computer for work—otherwise, her fingers become numb.

The environment needs to be warm but **not too dry**, as dry air irritates the bronchial tubes and causes congestion.

Voice-activated and room-by-room heating controls can improve accessibility and energy efficiency, especially when combined with good insulation. Although home automation is not affordable for everyone, it can increase independence—allowing users to open doors, turn on lights, or adjust thermostats.

However, it only provides partial assistance, and significant costs remain. Human support is still prioritized over technical solutions, as full independence is rarely possible even with automation.

During summer heatwaves, cooling down is often impossible, particularly between 11 a.m. and 4 p.m., the hottest hours of the day. **Some people are forced to stay indoors for several days in a row**. In Paris, the City Hall keeps a register of isolated individuals for such emergencies.

One respondent shared:

> "I was once in a near-vegetative state and couldn't do anything because of the 35–40°C heat. Being constantly in contact with heat-retaining surfaces made it even worse. Getting out of the shower was a critical moment—the cooler air in my apartment would drain my energy."

Humidity also causes pain for some people with chronic illnesses and can make it difficult to use certain equipment.

Many individuals rely on personalized solutions depending on their conditions—such as fleece clothing, hand warmers, baths, moisture absorbers, or portable air conditioners—though these solutions can be very expensive.

Issues related to brightness

Adequate lighting is essential for people with visual impairments, as it allows them to see and move around more easily.

Energy practices

Many participants reported constantly needing to charge various devices. These include equipment that compensates for disabilities—such as hearing aids (which must be recharged throughout the day for mild hearing loss), medical devices, food processors, computers used for online shopping, and telephones.

One participant uses respiratory medical equipment and receives partial reimbursement for electricity costs. She wears a respiratory mask at night and uses a *CoughAssist* device that helps her clear her airways, with financial compensation linked to its use.

As one respondent explained:

> "I'm completely dependent on electricity. If there's a power outage tomorrow, my only option is to go to the hospital."

Subscribing to off-peak electricity tariffs is one way some respondents try to reduce costs.

Half of the respondents reported needing **specific medical devices that require continuous power**. **A significant number also work remotely**, and more than half spend over 19 hours a day at home—resulting in high energy consumption.

5 respondents expressed having **difficulties paying energy bills**.

PV panels

Installing photovoltaic panels remains financially out of reach for most participants. Some mentioned they would have liked to install solar panels or produce their own heating pellets, but the costs were too high, and their income levels were too low to qualify for financial assistance.

> "I would like to have more information about technical solutions for installing solar panels."

There is also a **clear need for better information about available subsidies for installing heat pumps**, which can be financially beneficial in the long run for those who can afford the initial investment.

Mobility

Many participants rely on **electric wheelchairs, which must be recharged daily**. Public transport services are often unreliable, and private transport solutions are too expensive—sometimes leading to cancelled medical appointments.

Accessing buses can be difficult when the boarding ramps or plates are broken, which happens frequently. The same issues occur with the subway, where wheelchair access is often restricted or impossible. Some stations display wheelchair-prohibited logos or have broken access ramps that have remained unrepaired for years.

One participant reported using a petrol car, which consumes a lot of fuel and raises environmental concerns. However, electric vehicles and train travel remain unaffordable for most.

Frequent travel is necessary for medical care, but access to transportation remains a major barrier. Some doctors refuse to make home visits within Paris, and taxis sometimes decline short-distance trips in favor of longer ones. Few ambulance companies accept electric wheelchairs, which means there are limited options and fully booked schedules. As a result, some people are forced to travel lying down or on a stretcher.

All respondents in the survey reported **frequent difficulties accessing public transport, on a daily or weekly basis.**

Inclusion and public policy

People with disabilities are often excluded from public policy considerations. Many are unaware of their rights, both in general and specifically regarding energy-related support, while social workers are not always trained or informed on these issues.

Individuals with disabilities are rarely taken into account in legislative or policy decisions, and **currently there is no government minister dedicated to representing their interests**. A dedicated ministry could, for example, ensure that laws are systematically reviewed for inclusiveness.

State aid is also insufficient. Several public assistance programs have been reduced or phased out, leaving many people with disabilities in increasingly precarious economic situations.

3.3 Relationships Between Themes and Possible Explanations

Link between energy practices, temperature, brightness and mobility

People with disabilities face higher energy needs due to requirements for thermal comfort, adequate lighting, and mobility. Those with visual impairments depend on well-lit environments for safety, while individuals using electric wheelchairs, respiratory devices, or hearing aids rely on a constant supply of electricity for daily functioning.

The rising cost of energy forces many to make difficult choices between essential expenses. As one respondent explained:

> "Because of my disability, many of my electricity needs are not taken into account. I am not eligible for the energy voucher because I've worked before, which I find unfair. I am highly dependent on electricity—if there were a power cut tomorrow; my only option would be to go to the hospital."

This situation underscores that **electricity is not optional, it is a lifeline**. **Power outages or high costs directly endanger people's health, safety, and independence**. Energy is closely tied to medical care, mobility, and home comfort, and when energy poverty restricts device use, it affects physical well-being, social participation, and employment opportunities.

Yet, **the specific energy requirements of persons with disabilities are rarely recognized in existing support schemes**. Only a few severe illnesses are officially acknowledged, leaving many without adequate help. Expanding this list and adapting public aid to reflect real-world needs could reduce the additional financial strain currently borne by many disabled individuals.

Link between energy practices and PV panels

The need to recharge multiple devices and spend most of the day at home drives up electricity bills. However, renewable or cost-saving options (like solar panels or heat pumps) are financially inaccessible to most participants. Mobility expenses (fuel, transport fees, or taxis) further strain limited budgets, leaving less for energy needs. As a result, **even though energy-saving solutions exist, economic exclusion prevents their adoption.**

Link with public policies and all the other themes

Public policies fail to account for the specific energy and mobility needs of people with disabilities. There is a **lack of tailored support, poor dissemination of aid information, and insufficient training for social workers**. This policy blind spot affects every theme.

Lighting: No dedicated assistance for energy use related to visual impairments. Energy practices: No compensation for the extra electricity medical equipment consumes.

PV panels and energy transition: Subsidy schemes often exclude low-income or people with disabilities.

Mobility: Poor accessibility in public transport remains unaddressed.

4. Conclusions

People with disabilities experience heightened energy insecurity due to physical barriers, high costs, and a lack of tailored policies. Many struggle to heat or cool their homes, often maintaining low indoor temperatures to save money, while heatwaves pose serious health risks. Although individuals adopt personal coping methods, these remain insufficient to address the root causes of energy poverty.

Public support, such as direct aid for energy bills, improved home insulation, or accessible home automation systems, could significantly enhance comfort and well-being. Using off-peak electricity tariffs may also help reduce costs.

Some participants face life-threatening consequences during power outages, highlighting the urgent need for protective measures for those dependent on medical or mobility devices. While there is interest in solar panels and heat pumps, financial barriers and poor communication about assistance programs prevent adoption.

Mobility challenges further compound the issue: electric wheelchairs require daily charging, and public transport remains largely inaccessible. Moreover, people with disabilities are excluded from policymaking, often unaware of their rights, while social workers lack adequate training. Reduced state aid has deepened this vulnerability.

To address these gaps, several solutions are identified:

- Improving access to information and subsidies for energy support.
- Expanding training for social workers and related programs.
- Promoting affordable home automation and assistive technologies.
- Integrating these findings into ASSERT training materials to raise professional awareness.
- Developing inclusive energy policies that consider disability-related needs.

6.2.3 Greece

GREECE – FOCUS GROUP *Reporting document*

Online focus group - 11/07/2025

On site focus group - 18/09/2025

1.Introduction

The objective of this focus group was to gain a comprehensive understanding of the energy-related challenges faced by people with disabilities who experience energy poverty. The discussion focused on exploring how people with disabilities use energy, what kind of comfort they expect at home, and the ways they adjust their daily routines when faced with energy limitations.

The focus groups played a crucial role in uncovering the personal and complex aspects of living with disability under conditions of energy poverty. They provided participants with an open space to express their energy needs, not just in terms of usage levels, but in relation to maintaining health, independence, and daily life activities.

The findings from the focus group discussion will serve as a foundation for further analysis of how specific user needs and comfort expectations influence overall residential energy consumption. By identifying typical energy consumption profiles for disabled individuals in energy poverty, the research also aims to support more inclusive energy planning and targeted policy interventions designed to meet these needs.

1. Methodology

The first focus group was conducted online via Zoom on July 11, 2025. A total of four participants took part in the discussion: three individuals with quadriplegia and one with dysplasia. There was also gender balance among the participants, while the second one took place on site in Athens, with the support of NTUA, Municipality of Athens and the Office for tackling energy poverty.

The methodology emphasized active participation and inclusivity. A rotational approach was adopted during the discussion to ensure that each participant had the opportunity to respond to every question, elaborate on their perspectives, and express their views fully. The facilitation was sensitive to the personal nature of the topics discussed; participants were explicitly informed that they could skip any

question if they felt uncomfortable or preferred not to disclose personal experiences or data.

Data collection was qualitative in nature and centered on open conversation. Due to privacy concerns, participants chose not to share their energy bills or written documentation. Instead, the session relied on verbal exchanges and thematic exploration. The focus group dialogue was transcribed and analyzed thematically to identify key patterns, recurring concerns, and unique insights related to energy needs, comfort expectations, and adaptive energy practices.

2. Results

3.1 Survey results

The survey included 11 respondents (10 participated in the focus groups and 1 completed the survey beforehand but could make it at the end) with a slightly higher proportion of women (6) than men (5), and one unspecified. Age groups were distributed across 18–30 (3), 31–50 (4), and 51–70 (3). Most respondents live with family (7), while a few live alone (2), with a spouse (1), or in supported housing (1). Health conditions were common, with physical disabilities reported by 7 participants, one neurological condition, one reduced hearing, and one other/unspecified.

Most respondents live in urban areas (Thessaloniki, Athens, Petroupoli, Kilkis), primarily in apartments (9), with some single-family or collective housing. Housing ages mostly range from 1980 to 2010, with a few older than 1980. While many apartments feature good insulation and double/triple glazing, several older or poorly insulated homes reported visible mold, moisture problems, or inefficient heating systems. Central heating and air conditioning are common, while some use solar water heaters or biomass for heating. House sizes vary from 30–149 m^2, with one household exceeding 150 m^2.

Energy use patterns indicate that **almost all respondents rely on heating in winter and cooling in summer.** Most engage in energy-saving behaviors like turning off lights and appliances when not in use, but fewer adopt advanced energy-efficient solutions, such as solar energy or improved insulation. Cooking and laundry largely use conventional appliances, **while daily hours spent at home range from 7–10 hours for younger adults to 11–18 hours** for older adults or those working from home.

Monthly energy costs vary widely, from less than €50 to over €300, with higher costs often associated with older, poorly insulated apartments. Satisfaction with energy conditions is generally moderate to high among younger and older adults,

but some middle-aged respondents report discomfort with extreme temperatures, indicating unmet cooling or heating needs.

Key trends show that urban residents in newer, well-insulated apartments have lower energy costs and higher comfort, while those in older housing face higher expenses and thermal discomfort. Disability and health conditions influence energy needs, as affected respondents spend more time at home. Behavioral energy-saving practices are common, but the adoption of advanced efficiency measures remains limited.

Recommendations include targeting energy efficiency upgrades for older homes, promoting renewable energy solutions, providing support for disabled or elderly residents to optimize energy use, and encouraging broader adoption of energy-efficient practices. Tailored interventions considering household size, health, and local climate conditions could improve energy comfort and reduce costs.

3.2 Description of Main Themes

Discussion 1: How comfortable do you feel with your energy use at home? (Temperature, Humidity levels, Air quality, Lighting Conditions, Acoustic Conditions, Challenge in extreme weather conditions, energy practices)

Participants shared that, due to their health conditions and specific needs, they have increased energy requirements, resulting in higher energy costs. In particular, their sensitivity to extreme temperatures necessitates maintaining a stable indoor temperature of around 22°C throughout the year.

All participants discussed their living situations. Some reside in old apartment buildings from the 1980s, which are equipped with central heating systems. This means that during the winter, heating is only available during specific hours, as it is co-managed by all the residents in the building. As a result, these participants rely on **high-efficiency air conditioning units to meet their thermal comfort needs when the central heating is not in operation.** This significantly contributes to their electricity bills, especially given the rising cost of electricity.

During the summer, all participants reported using air conditioning to maintain a comfortable indoor temperature. They emphasized that existing state financial aid (such as the social tariff) is insufficient, as their high energy demands result in a large portion of their income being spent on energy expenses.

Additionally, one participant mentioned that the poor condition of their building causes humidity issues. To manage this, they also use a dehumidifier, which further increases energy consumption and costs. In summary, most participants highlighted the challenges of living in inadequate buildings, which forces them to purchase and use high-efficiency devices to meet their thermal comfort needs.

However, this leads to significantly high energy costs that the current social tariff does not adequately offset.

Further insights from individual participants reinforced these findings:

- Several participants reported **cold indoor temperatures in winter**, requiring heaters to run most of the day, which drives up energy bills.
- Others described **overheating in summer**, with poor ventilation and difficulty regulating temperature during heatwaves.
- **Temperature instability** was a recurring issue, with participants frequently adjusting heaters and fans to maintain comfort.
- **Poor insulation** and inefficient heating systems were cited as major contributors to discomfort and energy waste.
- One participant noted **humidity and dampness**, requiring additional appliances like dehumidifiers to manage indoor air quality.
- Energy-saving efforts were often constrained by **shared household dynamics**, **inefficient appliances**, and **the need to prioritize health and comfort** over cost-saving.
- Participants also described **strategic appliance use**, such as limiting usage during peak hours or tracking consumption, though these efforts were not always sufficient to reduce costs.

Discussion 2: What are the main barriers for you to access and use energy (or transport)? (Financial barriers, technology barriers, physical barriers, others)

Participants described **a range of mobility challenges** that directly impact their energy practices, access to support, and overall quality of life. Many live in older buildings with poor insulation and high energy demands, yet face significant **barriers in accessing financial aid or municipal services** due to both physical and informational constraints. Some participants stated that they navigate the city using electric scooters or public transportation. One participant mentioned owning two **types of scooters depending on travel distance, but noted that frequent charging adds to already high electricity bills.** Despite these needs, there is no financial support available to offset transportation-related energy costs.

Several participants emphasized the country's inadequate infrastructure. Poorly maintained pavements, lack of bicycle lanes, and inaccessible public spaces, such as heavy doors, stairs, and uneven sidewalks, limit their ability to move freely and safely. Public transportation is often overcrowded and not adapted to their needs. One participant shared **that they rely on taxis instead of buses, which is**

significantly more expensive. Another uses a specialized bus service for people with disabilities, accompanied by a personal assistant.

Beyond physical barriers, participants highlighted systemic obstacles to accessing support:

- **Online information about subsidies and services is often unclear or incomplete.**
- **Application processes are difficult to navigate, with one participant stating they "don't really know how to apply."**
- Bureaucracy slows down support, and tracking down the right contact person can be challenging.
- Transport to municipal offices is often inaccessible, making in-person assistance impractical.
- Local support structures are poorly coordinated, leaving participants unaware of available help.

Financial constraints compound these issues. Many participants fall into a gap: their **income is too low to afford high energy costs, but not low enough to qualify for subsidies. Moreover, existing subsidies are not tailored to the intersection of energy poverty and disability.** Shared households further complicate energy-saving efforts, as family needs drive up usage and limit control over appliance use.

In summary, participants stressed that mobility limitations, inaccessible infrastructure, and fragmented support systems create a cycle of exclusion. They called for:

- Tailored financial aid that reflects both energy and mobility needs.
- Simplified, accessible application processes.
- Improved coordination between municipal offices and local support networks.
- Infrastructure upgrades that prioritize accessibility and safety.

Discussion 3: What support would you like to receive to make it easier for you to access and consume energy (and be mobile)? (Financial aspects, technology aspects, physical aspects, others)

Participants unanimously expressed frustration with the **lack of targeted financial and structural support for people with disabilities experiencing energy poverty.** They emphasized that current schemes, particularly the social tariff, fail to address the intersection of disability, energy vulnerability, and mobility limitations.

The social tariff remains the only available mitigation measure, but its eligibility criteria are based on general social factors rather than the specific needs of individuals with disabilities. As a result, many participants are excluded from receiving support, despite facing high energy costs due to health-related needs and poor housing conditions. Several participants noted that their income is too low to cover energy expenses but not low enough to qualify for subsidies.

Others shared that the application process is complex, poorly explained online, and inaccessible for those with mobility challenges.

Participants called for a more inclusive and responsive policy framework. Their suggestions included:

Housing & Energy Infrastructure

- Home improvements such as insulation upgrades to reduce energy waste.
- Financial support for energy-efficient appliances and smart home devices, especially in shared households.
- Modifications to make homes easier to manage for people with mobility or sensory impairments.

Economic Support

- Increased and better-targeted subsidies that reflect actual energy needs.
- Financial aid for high energy bills and home upgrades.
- Support mechanisms that consider multi-person households with multiple energy-dependent members.

Accessibility & Information

- Remote access to energy support services, given that traveling to municipal offices is often impossible.
- Clear, accessible online guidance for subsidy applications.
- Awareness campaigns and better coordination with local NGOs and municipalities.
- Education on energy-saving practices tailored to different household types.

Physical Accessibility

- Improvements to municipal buildings and transport infrastructure to enable in-person support.
- Mobility support to reach offices and participate in public services.
- Recognition that inaccessible streets and heavy doors create barriers not only to movement but to accessing energy-related assistance.

Participants stressed that energy poverty cannot be addressed in isolation. The lack of accessible infrastructure, poor communication, and fragmented local support systems compound the problem. As one participant put it: “Sometimes it’s hard to think how to combat energy poverty when moving around is a problem as it is. ”In summary, the group called for a holistic, disability-sensitive approach to energy policy, one that integrates economic, physical, and informational support and reflects the lived realities of diverse households.

3.3 Relationships Between the Discussions and Possible Explanations

The three discussions are closely interlinked, with each one shaping and amplifying the others within the daily experiences of the participants.

Economic Constraints and Thermal Comfort

A clear relationship exists between the issues raised in Discussion 3 (support needs) and Discussion 1 (comfort with energy use at home). Participants described the necessity of maintaining a stable indoor temperature due to their medical conditions, which results in elevated energy usage. However, their ability to meet these thermal needs is constrained by inadequate financial assistance. The social tariff scheme, the only state-supported measure, is both inaccessible to many and insufficient in covering the high energy costs associated with the use of heating and cooling devices.

As a result, participants are forced to limit their use of heating or cooling, which can negatively affect their health and quality of life. Some rely on devices like dehumidifiers due to the poor condition of their buildings, compounding energy use. These examples illustrate how financial barriers directly affect participants’ ability to maintain thermal comfort and adapt their routines or home environments accordingly.

Participants also noted that shared households, especially those with multiple energy-dependent members, make it difficult to reduce consumption even when they try to limit appliance use. One participant explained that despite strategic use of heaters and fans, bills remain high due to the constant need for comfort and care.

Mobility, Infrastructure, and Energy Burdens

Transportation challenges discussed in Discussion 2 (barriers to energy and transport) are also strongly tied to the financial and infrastructural issues

highlighted in Discussion 3 (support needs). For example, participants using electric scooters must frequently charge them, which increases their electricity bills, an issue that overlaps with the high household energy costs described in Discussion 1. This shows how energy use is not only confined to household needs but is also tied to essential mobility and autonomy, especially for those with physical disabilities.

Moreover, the lack of accessible, safe public transport infrastructure leads some participants to rely on more expensive alternatives, such as taxis. These transportation costs, coupled with high energy bills, place a compounded financial burden on individuals.

Several participants described how inaccessible streets, heavy doors, and stairs prevent them from reaching municipal offices to apply for support. One participant shared that they "stay home more because buses and streets aren't accessible," which in turn increases indoor energy use. Others expressed frustration that even when NGOs or municipalities try to help, the information is not clearly communicated or easy to access.

Insights and Reflections

Across all three discussions, a consistent issue is the lack of tailored and inclusive policies. The participants' needs extend across energy, housing, transportation, and health, but support mechanisms fail to consider the complexity of these overlapping domains. For instance, the social tariff focuses narrowly on general social criteria, overlooking disability-specific energy needs. Similarly, transportation infrastructure and support systems do not address the diverse mobility needs of people with different disabilities. This systemic oversight reinforces cycles of exclusion, where individuals with disabilities face compounded disadvantages across multiple areas of daily life. The data reveal several key insights about the multidimensional nature of energy poverty for people with disabilities:

Energy poverty is about affordability, adequacy, and accessibility. For people with disabilities, energy is essential not only for comfort but also for health, mobility, and independence.

Current social policies do not capture complex, disability-specific needs. Measures like the social tariff, though helpful, exclude many individuals due to eligibility criteria that do not reflect the true cost of living with a disability. Infrastructure deficiencies amplify energy and financial burdens. Poor housing conditions and inaccessible public transport options lead to increased energy consumption and reliance on costly alternatives. Civil society organizations are filling a gap left by the state. NGOs and community-based groups appear to be the only actors addressing the intersectional needs of people with disabilities in energy poverty. Remote

access to support services is critical. Participants repeatedly emphasized that being able to access guidance and assistance from home would make a significant difference, as traveling to municipal offices is often impossible.

These challenges point to the need for holistic and inclusive policy approaches that recognize the specific and compounded barriers faced by individuals with disabilities. Addressing these issues and integrating support systems across housing, energy, transport, and social protection are essential for meaningful change.

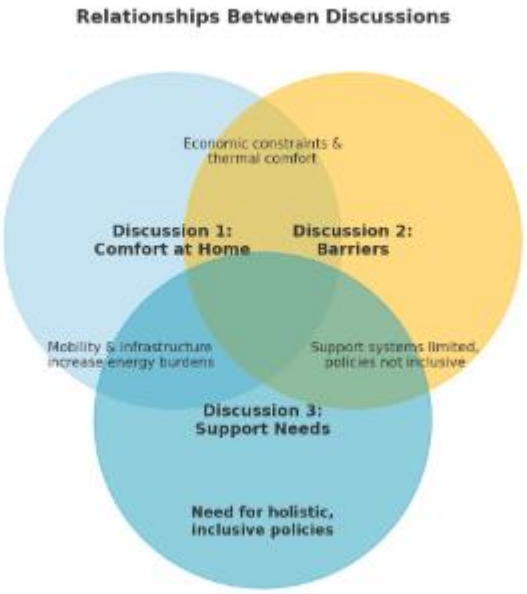


Figure 2 Relations between discussions

3. Conclusions

The focus group findings reveal that people with disabilities experiencing energy poverty face complex, interconnected challenges related to maintaining thermal comfort, managing high energy costs, and accessing appropriate mobility and transport options. A key insight is that energy poverty for this group extends beyond affordability, it deeply affects their health, autonomy, and quality of life. The need to maintain **a stable indoor temperature around 21–22°C, due to medical conditions, drives elevated energy consumption that is not adequately offset by existing social support schemes.**

Three major themes emerged consistently across the discussion:

1. Thermal Comfort and Energy Practices: Participants rely heavily on multiple **heating and cooling devices to maintain necessary comfort levels** in often poorly insulated and aging homes. This reliance leads to high electricity costs and increased financial strain. **Participants also described how shared households and multi-person energy needs make it difficult to reduce consumption, even when they try to limit appliance use.**
2. Barriers to Energy Access and Mobility: Energy use is not confined to household consumption; mobility aids such as electric scooters require frequent charging, adding to electricity bills. **The lack of accessible public transportation and safe infrastructure further limits mobility and increases reliance on costly alternatives.** Some participants reported staying indoors more often due to inaccessible streets and transport, which further increases energy use and isolation.
3. Insufficient Financial Support and Policy Gaps: Current social policies, such as the social tariff, do not reflect the specific energy needs of people with disabilities and often exclude many who need assistance. The absence of targeted financial aid and inclusive infrastructure exacerbates their vulnerability. Participants expressed frustration with unclear online information and bureaucratic hurdles that make it difficult to apply for support. Remote access to services was widely requested, as traveling to municipal offices is often impossible.

Overall, the findings reveal a pattern of compounded disadvantage: inadequate housing, high energy demands, and limited support mechanisms reinforce each other, leaving individuals to cope largely through personal strategies such as energy-saving practices and selective use of appliances. This coping comes at the expense of comfort and, in some cases, health.

Recommendations

Based on these findings, several areas for action emerge:

- **Adjustment of financial support schemes:** Eligibility and benefit levels of the social tariff (or similar programs) should be revised to reflect the higher and constant energy needs of people with disabilities, including mobility-related energy use. Support should also consider multi-person households, where energy use is driven by the needs of several members.
- **Improvement of housing energy performance:** Targeted subsidies or retrofitting programs should be provided in order to address poor insulation, humidity problems, and outdated systems in older buildings where many people

with disabilities reside. Participants emphasized that better insulation would reduce energy waste and improve comfort without increasing costs.

- **Integration of mobility and energy in policies:** Recognize that energy poverty extends beyond the home; transport-related energy costs should be considered in assistance programs. Charging mobility aids and relying on taxis due to inaccessible public transport are real energy burdens that must be acknowledged.
- **Enhancement of accessibility of public infrastructure:** safer pavements, accessible public transport, and alternative mobility solutions to reduce the financial and physical burden on individuals. Participants called for improvements to street design, building access, and municipal service coordination.

Suggestions for Training Materials

Based on the focus group discussions, the training materials should highlight the specific temperature requirements of people with disabilities, emphasizing that maintaining a stable indoor temperature often requires the simultaneous use of multiple heating and cooling devices, an aspect not widely understood outside affected communities. Including this information as clear data and real-life examples can raise awareness among policy makers, energy providers, and social support organizations about the unique and pressing energy needs of people with disabilities.

The materials should also address common housing challenges like poor insulation and humidity that increase energy costs, explain financial and policy gaps that often exclude disabled individuals, and cover mobility-related energy use and infrastructure barriers. Testimonies should include examples of inaccessible transport, difficulty reaching municipal offices, and confusion around subsidy applications. By incorporating testimonies, energy consumption patterns, and challenges shared by participants, the training can build empathy and deepen understanding of why generic solutions frequently fall short, promoting advocacy for more inclusive energy policies and support systems.

6.2.4 Italy

Report – Italy - Interviews

1.Introduction

This report presents the outcomes of Task T2.2 of the ASSERT project, which involved the organization and implementation of **focus groups and semi-structured interviews conducted in Italy** by Eurac Research. The activity was designed to gain an in-depth understanding of the energy needs, expected indoor comfort conditions, and everyday energy-related practices of individuals with disabilities who are experiencing energy poverty.

2.Methodology

Participants

Eight adult participants were enrolled (five males and three females) via purposive recruitment in accordance with the procedures set out in the **Toolkit** (chapter "Participant Selection Process"). Furthermore, the **inclusion and exclusion criteria** defined in the Toolkit were applied during recruitment and screening. Participants were assigned unique alphanumeric IDs for **pseudonymization** across data sources.

Survey administration

An online **survey** (SurveyMonkey.com) was administered **one week** prior to the interviews. Each participant received a unique participant code to ensure pseudonymization across instruments. Survey responses were reviewed in advance to tailor prompts and probes for the subsequent semi-structured interviews. See **Toolkit – Annex 3** for the full questions set.

Procedures and timing

Data collection comprised **semi-structured interviews** of approximately **60 minutes** per participant, conducted either face-to-face or via secure videoconferencing, depending on participant preference and accessibility needs. Interviews were carried out between September and November 2025. The interview guide covered: (a) perceptions and management of **indoor comfort** with

reference to thermal conditions, ventilation/indoor air quality (IAQ), lighting/daylight, and noise; (b) **barriers to accessing and using energy and transport systems**; and (c) **desired forms of support** and service provision. All interviews were audio-recorded with informed consent, transcribed verbatim, anonymized, and accuracy-checked prior to analysis. The full guide is provided in the **Toolkit (Appendix 6.1-5)**.

Thematic analysis

Data was analysed using **reflexive thematic analysis** [1] supported by MAXQDA 24 Software. The process unfolded iteratively across five phases.

First, a period of **familiarisation** involved repeated reading of the interview transcripts and systematic notetaking to identify salient meanings and emergent patterns within the data. This was followed by a phase of **data-driven coding**, during which the text was segmented into meaningful units and concise descriptive codes were generated using MAXQDA's Code System.

In the third phase, these codes were examined and grouped **into provisional themes**, and hierarchical relationships between themes and sub-themes were established.

The fourth phase focused on **reviewing and refining these themes** by assessing their internal coherence and external distinctiveness; this stage also involved the use of tools such as the Code Matrix Browser and Retrieved Segments to identify sub-themes as well as negative or variant cases.

Finally, the fifth phase consisted of **defining and naming the themes**, which entailed writing detailed memos for each theme, outlining their scope, inclusion and exclusion criteria, providing representative quotations, and describing their relationships to other themes.

Analytic transparency and credibility were enhanced through complementary strategies implemented throughout the study. Researcher reflexivity was maintained via **iterative memo-writing** during coding and theme development to document interpretive decisions and positionality. **Internal triangulation** was achieved through systematic within- and cross-case comparison to delineate convergences, divergences, and contextual boundary conditions. An **audit trail** was established by comprehensively documenting coding iterations, theme revisions, and decision rules in MAXQDA memos and project logs. Finally, concise **verbatim extracts** are integrated in the Results to anchor interpretations in the empirical record.

3.Results

Survey results

Eight participants (five males and three females) were interviewed and filled the questionnaire: two aged between 31 and 50 years, two more than 70 years and six between 51 and 70 years. Seven participants have physical disabilities, while another one has chronic debilitating conditions. Two participants are completely independent, two need occasional assistance, two needs regular assistance and two are completely dependent on a caregiver. All the participants live in apartments in multi-storey buildings. 5 participants live in the Trentino Alto Adige while 3 participants live in Lombardia.

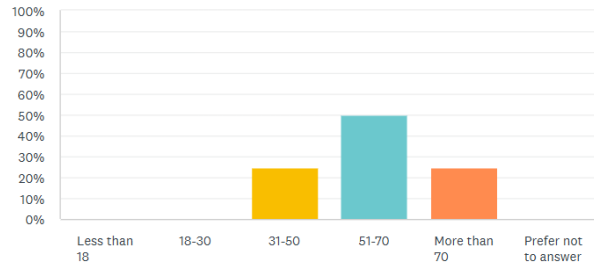
All the participants have double or triple-glazed windows and the 75% have a cooling system. Mould represents a problem for half the participants. None of the participants use renewable energy sistems. None of the participants know about the energy certification of their apartment. Electricity seems like the highest energy expenditure both in winter and in summer. In the survey, all participants reported being able to maintain an acceptable indoor temperature; however, two of them contradicted this statement during the interview. All the participants use winter heating, highly efficient lighting and they cook using gas/electric hob, oven, or microwave. The 75% of them use summer cooling and dishwasher and try to save energy by using less appliances. Seven out of eight respondents need a higher winter temperature due to their condition.

Two respondents report no difficulties in using the local transports, while two report having daily difficulties in using the local transports and six report having difficulties at least once a month.

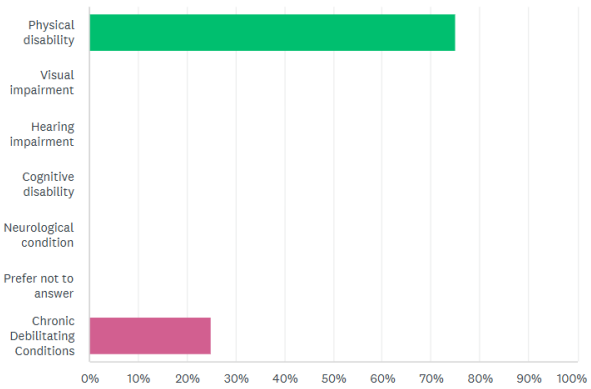
Four participants are satisfied of their overall comfort level inside their houses, while two are unsatisfied and two are neither satisfied nor unsatisfied. In the 70% of cases, the discomfort is mostly experienced in winter. The percentage of dissatisfied towards indoor winter temperatures is 25%, while for summer temperatures the 25% of people are slightly dissatisfied. All participants are satisfied or neutral towards the indoor air quality of their dwellings. The 25% of people are slightly dissatisfied towards their ventilation system. The 50% of people are unsatisfied or slightly unsatisfied towards daylighting. All the participants are feeling satisfied or neutral towards artificial lighting. The 25% of participants are feeling unsatisfied towards the acoustic environment of their dwelling.

Figure 1 shows the characterisation of the sample, their dwelling, expenditure and comfort needs as emerged from the questionnaires.

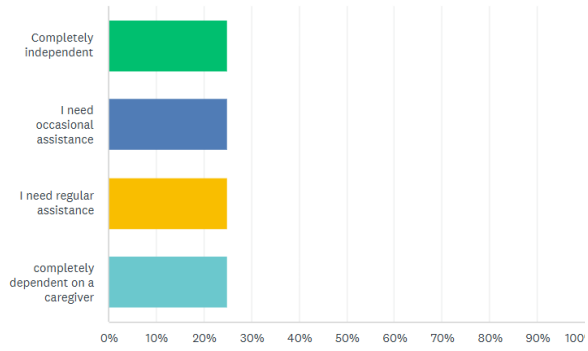
Age



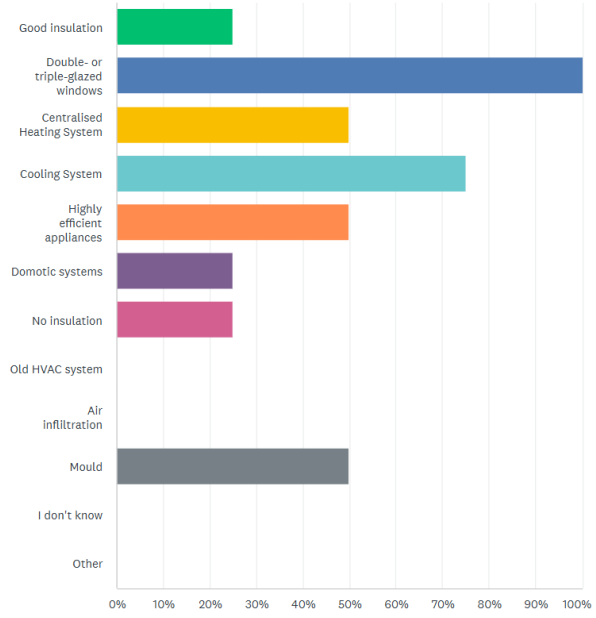
Disability



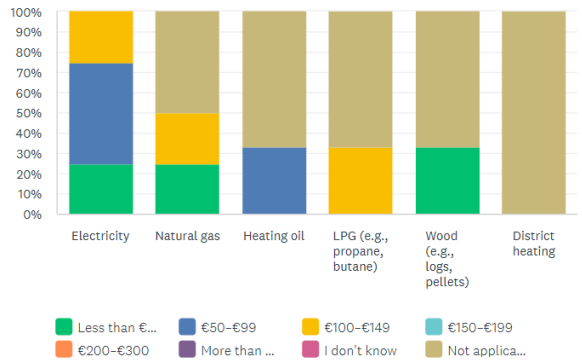
Autonomy



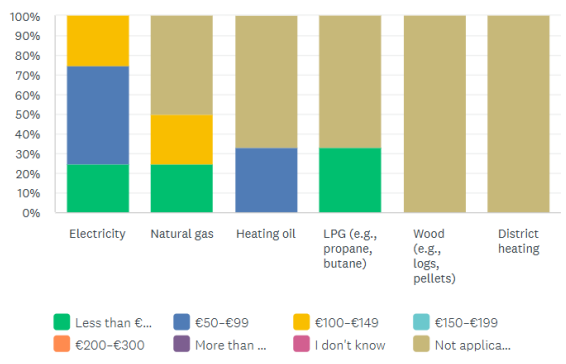
House characteristics



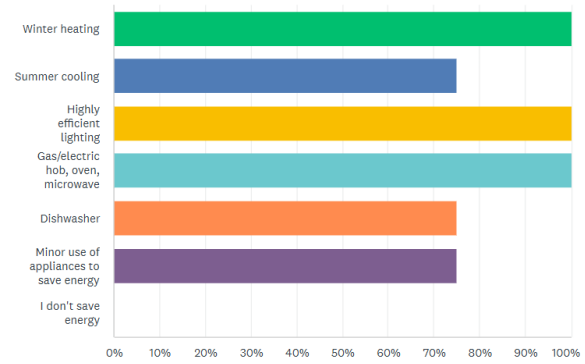
Winter energy expenditure



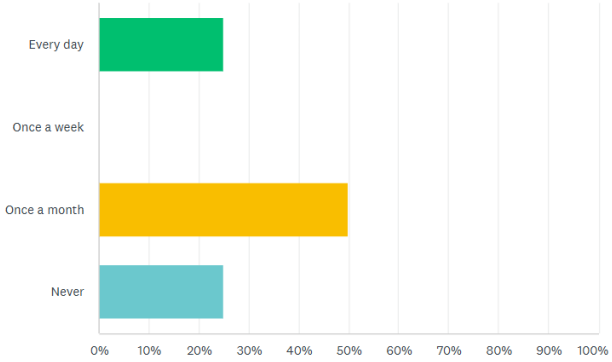
Summer energy expenditure



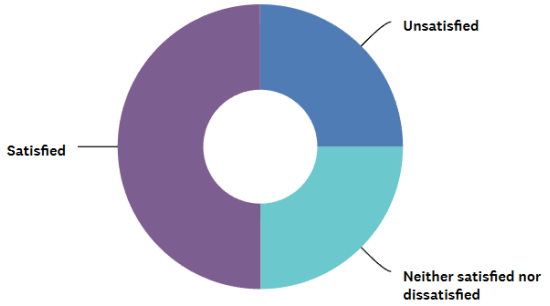
Daily habits



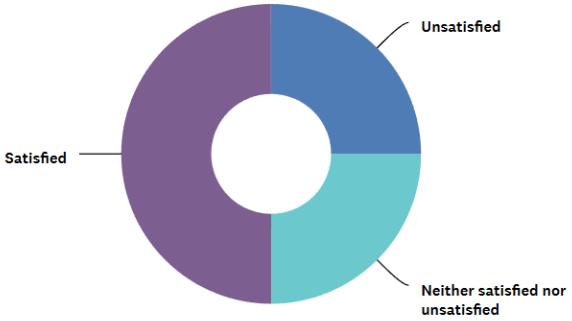
Difficulties in accessing local transport



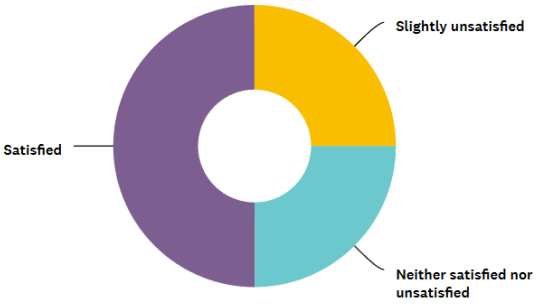
General comfort conditions



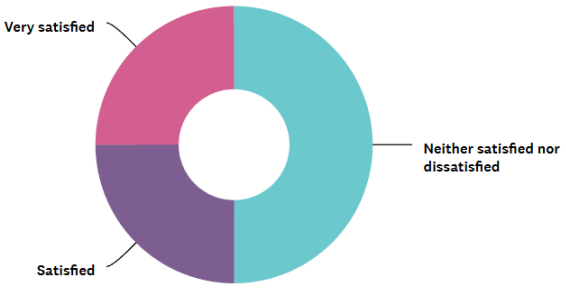
Winter temperature



Summer temperature



Indoor Air Quality



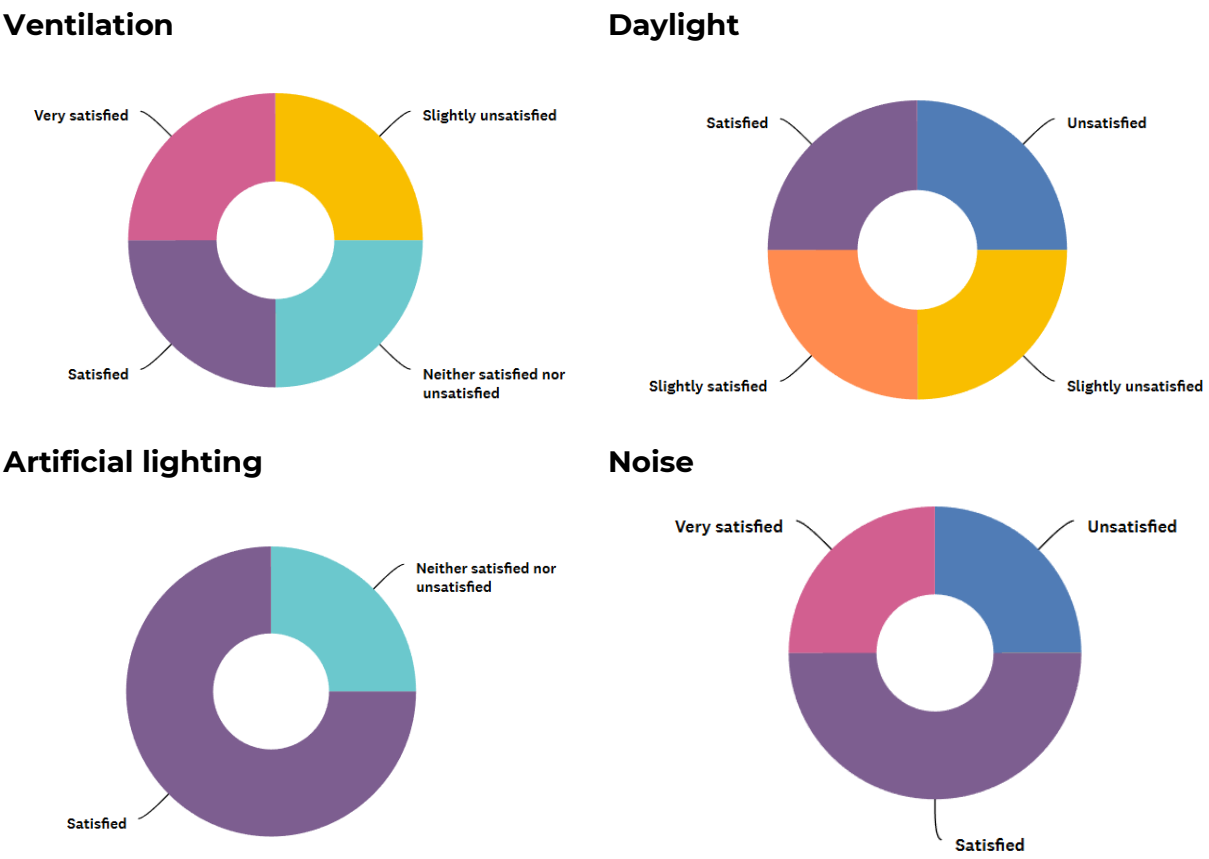


Figure 3 Results of the questionnaires (n=8).

Thematic Analysis

The thematic analysis of the eight Italian interviews conducted within ASSERT Task T2.2 revealed **10 major themes** that together offer a comprehensive picture of how individuals with disabilities perceive, negotiate, and manage indoor comfort, energy use, and related challenges (Figure 2 and Figure 3). These themes are described in the following sections. Furthermore, Appendix A reports a summary grid with the specific positioning of participants related to each theme. Appendix B shows some examples of the coding system.

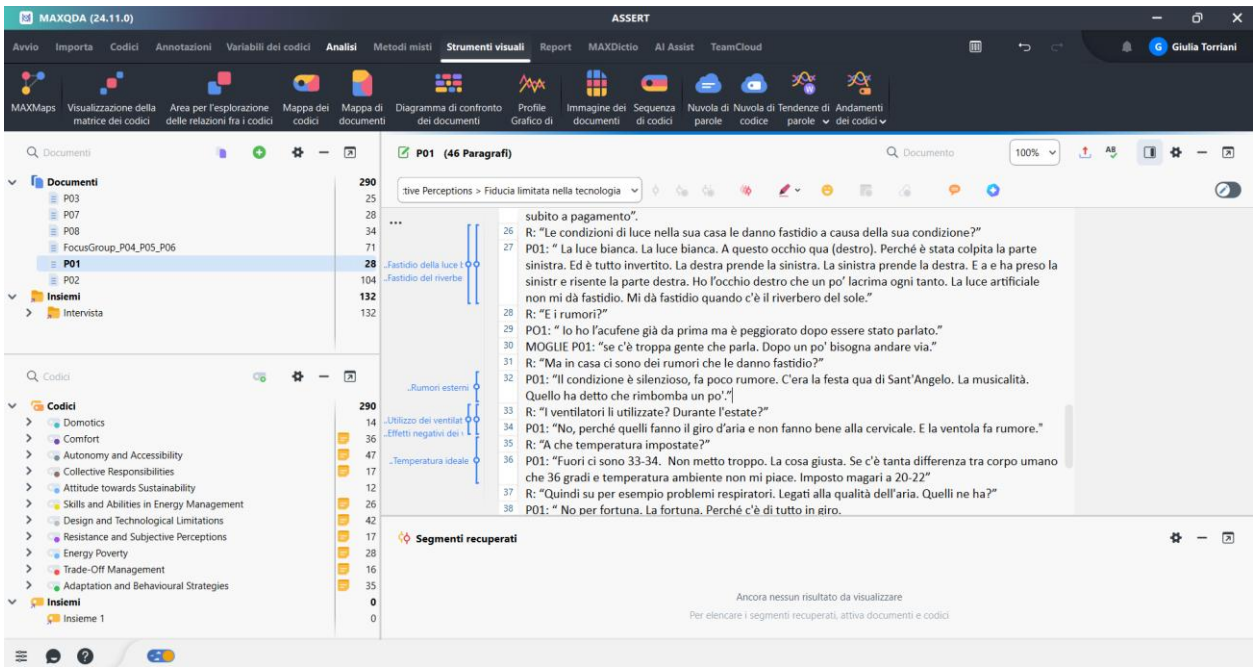


Figure 4 Screenshot of the qualitative data analysis process conducted with MAXQDA 24.

The software was used throughout all five phases of the reflexive thematic analysis — from data familiarization and initial coding to theme development, revision, and definition. The image shows the coding structure (left panel) and some examples of coded excerpts (centre). Annotations and analytic memos were systematically created and integrated at each stage of the process to support reflexive interpretation, ensure transparency in coding decisions, and trace the development of themes over time.

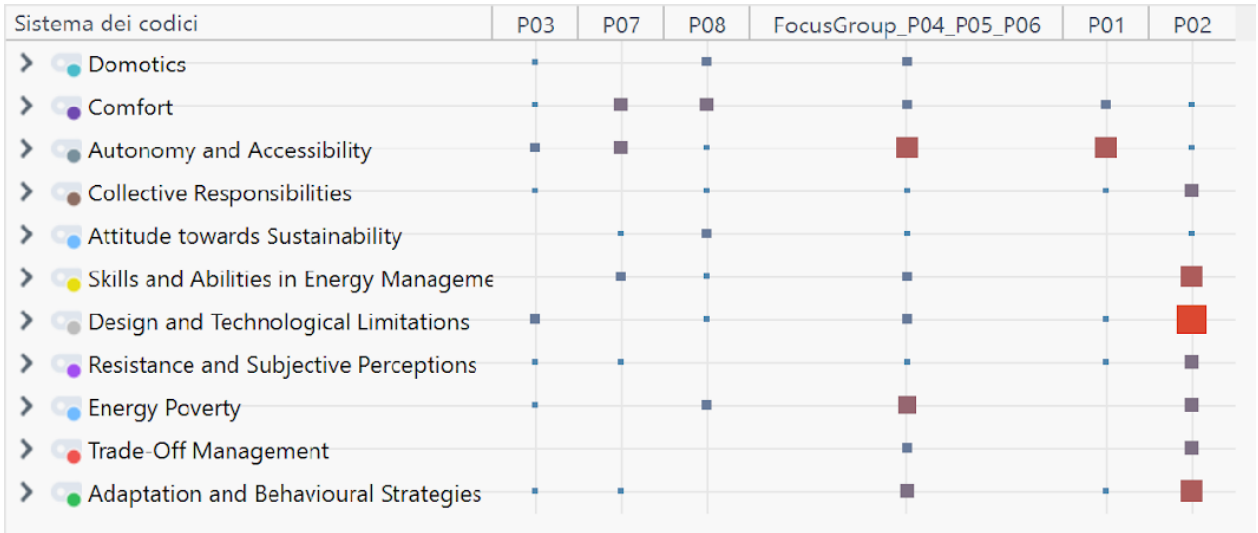


Figure 3 Code Matrix generated in MAXQDA 24, showing the distribution and frequency of coded segments across the main thematic categories identified in

the analysis. Each row represents a theme, while the size and intensity of the coloured squares indicate the number of coded excerpts within each category.

Theme 1 – Comfort

> *"Do the lighting conditions in your home bother you because of your condition?" - "White light. In this eye (the right one). Because the left side was affected, and everything is reversed. The right side takes over for the left, and the left for the right. The left was affected, and now the right side is sensitive. My right eye waters a bit sometimes. Artificial light doesn't bother me, but sunlight glare does." (P01)*
>
> *"Outside it's 33–34°C. I don't set [the air conditioning] too low, just the right level. If there's too much difference between the human body, which is 36°C, and the room temperature, I don't like it. I usually set it to around 20–22°C." (P01)*
>
> *"In summer it's harder, because the heat drains my energy" (P07)*

Theme definition: *Comfort* conceptualizes domestic comfort as a multisensory balance shaped by individual bodily perceptions and environmental conditions. Indoor comfort encompasses multiple dimensions such as thermal comfort, respiratory ease, visual comfort, acoustic comfort and the avoidance of sudden changes between body and ambient temperature. For the participants, comfort is primarily linked to the quality of air and the ability to breathe without difficulty, as well as the importance of avoiding thermal stress caused by rapid temperature fluctuations. Visual aspects, such as sensitivity to intense sunlight reflections or discomfort caused by artificial white light, also play a key role in shaping subjective perceptions of comfort. Traffic is recognized as the main cause of acoustic discomfort.

Inclusion criteria: This theme includes segments that describe comfort in relation to perceived indoor environmental quality (e.g., thermal, indoor air, visual, acoustic quality), or bodily sensations that indicate a state of well-being or discomfort.

Exclusion criteria: It excludes references that focus exclusively on technical aspects of indoor environments (e.g., heating system performance) without linking them to subjective comfort perceptions or mentions of adaptive behaviours without an explicit connection to comfort.

Relationship to other themes: Comfort is closely connected to *Adaptation and Behavioural Strategies*, as many of the strategies described by participants aim to restore or maintain desired comfort conditions. It also intersects with *Managing Trade-offs*, since achieving comfort often requires balancing conflicting needs (e.g., ventilation versus noise, light versus privacy). Additionally, *Subjective Perceptions*

and Resistance inform this theme, as beliefs about what constitutes comfort influence behaviours and technology use.

Theme 2 – Autonomy and Accessibility

> *"My wife drives me there by car." (P01)*
>
> *"Yes, yes, I used to ride a bicycle. The problem is that, because of my chronic illnesses, it's quite exhausting. I think they also cause chronic fatigue, so if I have to ride for 20 minutes by bike — whether in summer under the sun or in winter — it means I have to take into account that the energy I use for that won't be available for anything else during the day." (P02)*
>
> *"Every now and then my partner scrapes the mould off, but I'm not able to do it myself." (P03)*
>
> *"I use a dehumidifier, but I can't always empty it on my own, so I have to rely on someone." (P08)*

Theme description: *Autonomy and Accessibility* explore the ways in which physical, social, infrastructural, and personal conditions shape individuals' capacity to act independently and participate fully in daily life. For many participants, autonomy is significantly constrained by chronic health conditions and disabilities, which lead to persistent fatigue and limit their ability to engage in daily activities such as cycling or moving around the city. These physical limitations intersect with structural barriers — including inadequate infrastructure, insufficient support networks, and poor accessibility of transportation systems. Beyond physical limitations, the lack of adequate social support and opportunities for meaningful interaction amplifies a sense of isolation and solitude, highlighting how autonomy is also an emotional dimension. Barriers such as insufficient charging infrastructure for electric mobility, inadequate communication systems, and the absence of tailored services prevent individuals from meeting their basic needs or exercising control over their living environment.

Inclusion criteria: Segments that describe conditions affecting individual autonomy (e.g., chronic illness, mobility limitations, communication difficulties), experiences of dependence on others for daily activities, or the role of support networks in enabling autonomy. References to infrastructural or systemic barriers (e.g., inaccessible public transport, inadequate charging points) are also included.

Exclusion criteria: Segments focusing exclusively on energy use, comfort strategies, or technological choices without reference to autonomy or accessibility constraints are not included in this theme.

Relationship with other themes: This theme is closely linked to *Energy Poverty*, as financial constraints can further limit access to resources and services essential for autonomy.

Theme 3 – Collective Responsibilities

> *"Yes, there's also the issue of who should take responsibility. I mean, as a tenant and not as the homeowner, I do benefit from it, but to what extent should I be the one financing these improvement works, and to what extent should it instead be the responsibility of the person who owns the house?" (P02)*
>
> *"There was the Sant'Angelo festival here. The music — someone said it echoed quite a lot." (P01)*
>
> *"There's also an issue, since it's an internal courtyard. Well, it's not that disturbing, but if there are children playing in the courtyard, shouting and so on, it does become annoying — perhaps less so than the sound of a drill going straight into your head." (P02)*

Theme description: The theme *Collective Responsibilities* explores how domestic well-being is shaped not only by individual choices and behaviours but also by the actions, decisions, and dynamics of others. Everyday comfort is influenced by a complex network of interdependencies that extend beyond the private sphere of the home, involving neighbours, building management, condominium governance, and the broader community. Participants describe how noise from external sources — such as public events, children playing, renovation works, or public transport — directly affects their perception of comfort and disrupts domestic routines. The level of tolerance towards these disturbances varies, often depending on the type, frequency, and perceived legitimacy of the noise. Disputes or ambiguities regarding who is responsible for maintenance costs — whether tenant, landlord, or condominium — highlight relational challenges that shape housing comfort.

Inclusion criteria: Segments that describe the influence of others (neighbours, building managers, community) on domestic comfort and perception of the shared responsibility for building maintenance, renovation, or management decisions.

Exclusion criteria: Segments focusing solely on individual actions or personal strategies without reference to others' roles. Descriptions of technical building issues without a social or collective dimension.

Relation to other themes:

- *Energy Management and Informed Choices*: overlaps occur where lack of clarity in shared billing or decision-making affects energy use and comfort.
- *Trade-Off Management*: collective dynamics can increase the need for compromises (e.g., tolerating noise for social events).
- *Adaptation and Behavioural Strategies*: some adaptive behaviours emerge as responses to collective constraints.

Theme 4 – Skills and Abilities in Energy Management

> *"But I would definitely like something that clearly explains how to understand a bill — something that explains the terms that are used." (P02)*
>
> *"With Dolomiti, you can access all your bills. There are various items and all that, but obviously, as someone who's not an expert... I don't feel I have the competence to really understand what I'm reading." (P02)*
>
> *"And in this condominium, I heard that we installed solar panels. Supposedly for the shared energy needs, but I can't really say whether it works or if they're actually there." (P05)*
>
> *"Oh no, I don't know anything about these things [renewable resources]. I know my son talks about them every now and then, but I don't understand much." (P07)*

Theme description: *Skills and Abilities in Energy Management* captures how individuals are capable of monitoring and understanding of household energy use, as well as the obstacles they face in making informed decisions. Central to this theme is the widespread perception of energy bills as complex, opaque, and "mysterious". Participants reported difficulties in interpreting consumption data, identifying fixed and variable costs, and predicting fluctuations, which creates uncertainty and undermines their ability to manage household budgets effectively. The lack of technical knowledge and specific competences is perceived as a major barrier that prevents individuals from exercising control over their energy practices. This knowledge gap is compounded by variability in billing systems and a lack of transparency in how charges are calculated, leading to confusion and frustration. At the same time, participants expressed a clear demand for accessible tools and services to enhance their agency as consumers. These include real-time monitoring devices that allow users to track consumption against predefined budgets, alerts to prevent overspending, and systems that facilitate the comparison of suppliers and contracts. Participants emphasized the need for practical advice on improving

energy efficiency, both in existing dwellings and during purchase or renovation processes.

Inclusion criteria: This theme includes excerpts describing difficulties in reading, understanding, or predicting energy bills; mentions of knowledge gaps and lack of competence; expressions of frustration about the lack of transparency; and requests for tools, services, or advice to support informed choices.

Exclusion criteria: Segments dealing exclusively with economic hardship without explicit reference to informational or knowledge barriers are excluded, as excerpts solely related to structural housing or technology inefficiencies.

Relation to other themes: This theme intersects with *Energy Poverty*, since financial difficulties are often exacerbated by a lack of transparency in billing systems. It is also closely related to *Resistances and Subjective Perceptions*, where frustration and distrust towards technological and structural solutions may reinforce reluctance to engage with energy management. Furthermore, it connects with *Design and Technological Limitations*, as the absence of smart monitoring and automated systems intensifies the challenge of managing energy in an informed way.

Theme 5 – Design and Technological Limitations

> *"In winter there's the radiator and the stove. In winter we're comfortable even without a coat or anything else. The living room faces south with large windows, while the bedrooms face north with smaller windows." (P01)*
>
> *"And especially in the bathroom, where we had to turn on the fan because it was connected to the light. So you couldn't choose to turn it off — if you wanted the light on, you had to turn them on together. And it was definitely a very old system, so it was very noisy." (P02)*
>
> *"I'm not feeling comfortable, because they installed the thermostat in the kitchen, the part of the house that heats up the most, so the bedroom stays cold." (P03)*

Theme description: *Design and Technological Limitations* examine how architectural configurations and technological systems shape domestic comfort, often acting as structural constraints that reduce the effectiveness of adaptive behaviours or make certain comfort strategies difficult to implement. These limitations emerge in different forms, including inadequate spatial layouts, outdated or inefficient systems, and the absence of automation or smart control solutions. From a spatial perspective, the orientation and configuration of rooms strongly influence thermal and visual comfort. For instance, the positioning of living

spaces to the south with large windows and bedrooms to the north with smaller openings can promote natural thermal regulation, whereas poor spatial planning, limited exposure, and inadequate natural ventilation lead to recurring issues such as mould formation and condensation. Technological obsolescence is another central dimension of this theme. Manual devices, basic thermostats, and noisy ventilation systems control limit the ability to regulate indoor environmental conditions effectively. Inefficient ventilation systems and extractor hoods, as well as the need to frequently open windows even during winter, further compromise energy efficiency. Furthermore, the lack of automation and advanced control technologies (e.g., programmable thermostats, adjustable lighting systems) restricts the ability of occupants to adapt to indoor environments and to save energy.

Inclusion criteria: This theme includes excerpts that describe spatial, structural, or technological factors negatively affecting comfort; issues related to outdated or inefficient systems; and references to the lack of automation, accessibility, or control technologies.

Exclusion criteria: Segments focused solely on behavioural strategies or subjective perceptions, without a direct connection to structural or technological limitations, are excluded.

Relation to other themes: This theme is closely linked to *Adaptation and Behavioural Strategies*, as design and technological constraints often dictate the need for adaptive behaviours. It is also related to *Energy Poverty*, since structural inefficiencies can increase energy costs and exacerbate economic vulnerability.

Theme 6 – Resistance and Subjective Perceptions

> *"How comfortable would you feel using smart home devices?" "Well, since I've always lived in a house without them, I wouldn't really know how to use them." (P02)*
>
> *"Do you use fans during the summer? No, because they create air movement, and that's not good for my neck." (P01)*
>
> *"But honestly, I don't like automatised systems." (P05)*

Definition of the Theme: Resistances and subjective perceptions explore the set of attitudes, personal beliefs, bodily perceptions, and values that shape — and often limit — the adoption of technologies, strategies, or behaviours related to domestic comfort. These resistances emerge from individual experiences and subjective interpretations of well-being, health, and safety, which may lead to the conscious avoidance of available technical solutions or to their selective and critical use. For

participant P01, for instance, the use of fans is deliberately avoided because moving air is perceived as harmful to the neck. In the case of P02, the main resistances stem from personal conditions and limited technological familiarity: chronic illnesses and fatigue reduce the ability to perform everyday activities such as cycling, while a lack of experience with smart home systems leads to uncertainty and privacy concerns, resulting in the avoidance of devices like voice assistants. Other elements of resistance include difficulties in understanding energy bills, perceptions of inadequate design choices, and a general sense of distrust toward existing housing solutions.

Inclusion criteria: This theme includes excerpts that describe personal perceptions or beliefs related to health, well-being, or safety that lead to the avoidance of specific technologies or behaviours; difficulties or resistance associated with low technological literacy or lack of digital skills; challenges due to physical or health conditions that limit adaptive behaviours; and expressions of distrust, frustration, or rejection of existing housing solutions.

Exclusion criteria: Segments describing choices driven solely by economic constraints, decisions based on purely environmental or objective physical reasons without a subjective perceptual component, or barriers of a technical or structural nature related to the building are excluded.

Relation to other themes: This theme is closely related to Energy Poverty, as both explore barriers to adopting energy solutions. However, here the emphasis is on subjective perceptions and beliefs rather than on economic conditions. It is also linked to Adaptation and Behavioural Strategies: while that theme describes concrete actions taken by residents, Resistances and Subjective Perceptions focus on the reasons why certain actions are not undertaken.

Theme 7 – Energy Poverty

"For at least one or two years we couldn't afford to use the heating because our condominium bills were extremely high." (P02)

"What are the main obstacles you see to living in a self-sufficient home? Do you perceive them as more economic or more related to knowledge and access?" — " I'd say it's mainly an economic issue. Even just being able to afford a house is difficult for my generation." (P02)

"I have a lot of energy consumption because of... well, the wheelchair or the lifting device, depending on the day. Then I have the night-time fan. And lately I also have the PEG pump. So, yes... my electricity consumption is quite high." (P05)

"Financial support is helpful, of course. I manage on my own — I've worked, I'm retired now, and I also receive the care allowance, so I can make ends meet. But

there are many people who haven't had the opportunity to work during their life, either because of the severity of their disability or because, for other reasons, they simply couldn't." (P06)

"To drive, I need special equipment, and not all cars are suitable. I had to spend much more to find the right car and have the device installed. The car needs to be tall and spacious, but SUVs are more expensive. In the end, I went for a Peugeot." (P08)

Definition of the theme: *Energy Poverty* describes the impact of economic hardship and high energy costs on everyday practices, and overall comfort. Financial precarity leads residents to severely limit their use of essential energy services such as heating and hot water. While access to state support schemes (e.g., subsidies or reimbursements based on low ISEE scores) provides some relief, managing household expenses remains complex and is frequently described as a source of frustration and stress. The situation of hardship related to energy consumption is made even more evident by the needs of disabled individuals, who require higher indoor temperatures in winter and rely on energy-intensive medical devices. Beyond its immediate effects, economic vulnerability represents a significant barrier to achieving more efficient, self-sufficient, and sustainable housing models, influencing not only current comfort but also the capacity to plan and invest in long-term solutions.

Inclusion criteria: This theme includes interview segments describing:

- Economic difficulties that directly limit energy use (e.g., keeping the heating off, reducing hot water usage, being unable to invest in energy efficiency improvements).
- Feelings of frustration, stress, or anxiety linked to paying energy bills or managing household budgets.
- References to financial support mechanisms, subsidies, or reimbursements associated with economic vulnerability.

Exclusion criteria: It does not include segments describing adaptive strategies without explicit reference to financial constraints, nor purely technical discussions of efficiency or building systems that omit the economic dimension.

Relation to other themes: *Energy Poverty* is closely related to *Adaptation and Behavioural Strategies*, as many adaptive responses emerge directly as coping mechanisms to financial constraints. However, the focus here is on structural causes and social consequences rather than the strategies themselves. It also connects to *Design and Technological Limitations*, since inadequate insulation or inefficient systems can exacerbate economic vulnerability. Finally, it intersects with

Managing Trade-Offs, though in this theme the driving force behind compromises is explicitly economic, rather than linked to environmental preferences or conscious lifestyle choices.

Theme 8 – Managing Trade-Offs

"For at least one or two years we couldn't afford to use the heating because our condominium bills were extremely high." (P02)

"What are the main obstacles you see to living in a self-sufficient home? Do you perceive them as more economic or more related to knowledge and access?" — " I'd say it's mainly an economic issue. Even just being able to afford a house is difficult for my generation." (P02)

"I have a lot of energy consumption because of... well, the wheelchair or the lifting device, depending on the day. Then I have the night-time fan. And lately I also have the PEG pump. So, yes... my electricity consumption is quite high." (P05)

"Financial support is helpful, of course. I manage on my own — I've worked, I'm retired now, and I also receive the care allowance, so I can make ends meet. But there are many people who haven't had the opportunity to work during their life, either because of the severity of their disability or because, for other reasons, they simply couldn't." (P06)

"We also started turning the heating on occasionally. But you see, if you then have to open the window to cook..." (P02)

"And then there's the issue of drying clothes. Because the house is so small, we avoided hanging laundry indoors since we didn't want to increase humidity. So we had to hang them on the balcony — but handling wet clothes in winter isn't exactly pleasant." (P02)

"As for me, well... I air out the place even more than once a day, even if it's cold. It's also because I have cats going in and out, so, you know... that's how it is." (P06)

Definition of the theme: Managing Trade-Offs captures the ongoing process of balancing between competing comfort-related needs that characterise everyday domestic life. Rather than involving clear-cut decisions, household management is defined by compromises, where improving one aspect of well-being almost inevitably results in the deterioration of another. Residents must constantly evaluate and mediate between thermal comfort, ventilation, natural light, privacy, noise, and practicality, making choices that reflect a dynamic balance of priorities and constraints. For instance, keeping windows open reduces humidity and

prevents condensation but simultaneously leads to heat loss; keeping them closed ensures privacy and acoustic insulation but worsens indoor air quality. Similarly, lowering blinds improves privacy but reduces natural light, while drying clothes outdoors helps prevent excess humidity but becomes inconvenient during the winter. The need to protect pets may further limit opportunities for ventilation, adding another layer of complexity to decision-making.

Inclusion criteria: This theme includes all segments describing situations where multiple environmental needs are in conflict (e.g., ventilation versus thermal comfort, light versus privacy) or where daily decisions involve simultaneous benefits and drawbacks.

Exclusion criteria: It does not include segments describing straightforward adaptive strategies that do not involve a compromise (e.g., "I open the windows to cool the room"), nor references exclusively to structural or technical problems without mention of trade-offs.

Relation to other themes: This theme is closely related to *Adaptation and Behavioural Strategies*, as both deal with everyday actions. However, while adaptation focuses on what residents do, *Managing Trade-Offs* focuses on how and why decisions are made when different needs compete. It also connects to *Design and Technological Limitations*, as inadequate building design or outdated systems may exacerbate the need for compromises, even if they are not the main focus of this theme.

Theme 9 – Adaptation and Behavioural Strategies

> *"In summer we take cold baths and keep bowls of cold water to soak our feet. The good thing is that we have a very liveable balcony, so we spend a lot of time there." (P02)*
>
> *"We kept the heating turned off and wore a few extra layers." (P02).*
>
> *"I've equipped myself with, well... a sort of rechargeable shawl. It heats up and then you have to recharge it. An electric shawl, let's say." (P06)*

Definition of the theme: Adaptation and Behavioural Strategies capture the range of actions, everyday practices, and intentional decisions that residents implement in response to changing indoor and outdoor environmental conditions in order to maintain acceptable levels of comfort. Adaptation combines the use of available technologies with low-cost solutions (e.g., personal comfort systems such as electric shawls) and flexible behavioural adjustments. During summer, the use of air conditioning or the exploitation of outdoor spaces such as balconies is perceived as essential to improve air quality and reduce thermal discomfort. In winter,

comfort can often be restored through passive strategies such as clothing insulation or blankets. Daily activities are also organised according to adaptive logics; for example, scheduling outings during cooler hours of the day, avoiding midday exposure, or taking advantage of balconies and nearby green spaces. Simple, practical solutions such as lowering shutters, opening windows to control condensation, or using parasols and bowls of cold water in the absence of air conditioning are also widely reported.

Inclusion criteria: this theme encompasses interview segments that describe:

- Low-cost daily strategies aimed at improving comfort and well-being, such as window ventilation, light management, scheduling activities around environmental conditions, clothing choices, and the use of cold water for passive cooling.
- The use of technological devices (e.g., air conditioners, heaters, thermostats, or fans) as part of adaptive responses.
- Passive solutions for mitigating unfavourable climatic conditions, including shading or exploiting architectural features.

Exclusion criteria: The theme does not include:

- Segments that discuss exclusively structural problems of the dwelling without reference to adaptive responses.
- Discussions of economic or social barriers that prevent adaptation.
- Statements about comfort that are purely evaluative and not linked to concrete behaviours.

Relation to other themes: This theme is closely connected to several others. It relates to *Managing Trade-Offs* in that both address decision-making in daily life; however, while the latter focuses on the balancing of competing needs (e.g., ventilation versus noise), Adaptation and Behavioural Strategies centres on the practical actions taken. It also links to *Comfort*, which describes the environmental conditions that adaptive practices aim to achieve. Finally, it interacts with *Resistances, and Subjective Perceptions* as well as *Autonomy and Accessibility*, which can shape or constrain the implementation of adaptive strategies but are not themselves part of this theme.

Theme 10 – Domotics

"I've installed motorised blinds that I control from my phone, and I must say they've changed my life. " (P08)

"I've installed a smart thermostat that automatically adjusts the temperature. This way I use less energy, and I don't need to move every time, which is already a great advantage for me. " (P04).

Definition of the theme: *Domotics* refers to the use of home automation technologies that enhance autonomy, independence, and everyday functioning for people with disabilities. This theme captures participants' experiences with smart systems—such as automated lighting, motorised blinds, smart thermostats, and integrated device ecosystems—that can be operated through voice commands, wall-mounted controls, or mobile applications. Domotics reflects how interconnected and adaptive technologies support users in managing their home environment more easily, reducing physical effort, and improving overall usability of daily routines.

Inclusion criteria: this theme includes data segments that describe:

- The installation, use, or perceived advantages of smart home and automation systems.
- The role of voice control, mobile apps, or remote-operated devices in supporting daily activities.
- Perceptions of improved autonomy, convenience, or reduced physical strain made possible by domotic solutions.
- References to integrated ecosystems of interconnected devices (e.g., lights, blinds, temperature regulation working together).

Exclusion criteria: this theme excludes:

- Segments focusing solely on comfort outcomes achieved through technology (coded under *Comfort*).
- Narratives about accessibility challenges or autonomy issues that do not involve domotic or automated solutions (coded under *Autonomy and Accessibility*).

Relationship to other themes: This theme is connected to:

- *Autonomy and Accessibility*: Domotics is closely connected to this theme because home automation can compensate for physical limitations, enabling users to perform tasks that would otherwise be difficult or impossible. Smart systems often represent concrete solutions that enhance independence and reduce the need for external assistance.

- *Comfort*: Domotics also relates to comfort, as automated light, temperature, and shading control can improve environmental conditions at home. However, when participants discuss comfort *without* explicitly mentioning automation, those segments are coded separately under *Comfort*.

Theme 11 – Attitude Towards Sustainability

"Yes, but actually, from what I know, Dolomiti uses renewable energy. And that was exactly what we liked about this company. We didn't choose it ourselves — it was simply the one already in place. We just transferred the contract, but then we decided not to change it, also because, supposedly, they use energy from renewable sources." (P02)

""Well yes, I have a bit of climate anxiety, so if I could go live in a self-sufficient cabin in the woods, that would be amazing." (P02)

"My son helped me replace all the light bulbs with LED ones, and I've noticed that the bill is a bit lower. Even though I don't understand much about these things, I like knowing that I'm doing something good for the environment." (P07)

"I asked for a few quotes for solar panels, but in the end I didn't install them. With the costs and the work needed in the house, it would be a bit complicated for me to manage. But I still think about it often, because I like the idea of a sustainable and self-sufficient home." (P08)

"As for photovoltaic systems, since Italian law basically allows a kind of 'Wild West' freedom to install solar panels, the assembly did approve it, but in the end no one installed anything. Also because the issue is that it's hard to use the energy produced on a shared roof in a fair way for the person who installs the system. So what should happen?

If the person installing it lives on the first floor, for example, they would have to run cables all the way down to their flat, and so on and so on." (P04).

Definition of the theme: This theme refers to participants' orientations, beliefs, motivations, and emotional responses related to environmental sustainability and low-carbon living. It captures both practical behaviours (e.g., adopting LED lighting) and aspirational or value-driven attitudes (e.g., interest in renewable energy, desire for autonomous and sustainable lifestyles). The theme also includes mixed feelings, ranging from enthusiasm to climate anxiety, and highlights how personal environmental values shape energy-related decisions, even if external constraints (e.g. high costs, technical difficulties) limit action.

Inclusion criteria: Include extracts that involve:

- Positive or aspirational attitudes toward environmentally sustainable living.
- Expressions of interest in renewable energy technologies (e.g., solar panels, green tariffs), regardless of actual adoption.
- Descriptions of minor sustainable behaviours motivated by environmental concern (e.g., switching to LED bulbs).
- Emotional or value-based reasoning linked to sustainability (e.g., climate anxiety, desire for energy autonomy).
- Reflections on choosing or maintaining energy providers because of their renewable energy claims.

Exclusion criteria:

- Focus solely on economic motives for reducing energy consumption, unless sustainability motivations are also explicitly mentioned.
- Discuss renewable energy systems primarily in terms of technical barriers, governance issues, or installation challenges without reference to environmental values (these belong to Design and Technological Limitations or Collective Responsibilities).
- Describe energy behaviours driven purely by comfort, health, disability, or necessity (e.g., medical devices), with no sustainability orientation.
- Reflect general concerns about bills or household budgeting unrelated to environmental motivations (these relate to Energy Poverty or Trade-Off Management).

Relationship with other themes:

- Collective Responsibilities: Linked when shared decision-making in condominiums impacts the feasibility of sustainability initiatives (e.g., shared roofs for PV systems).
- Design and Technological Limitations: Overlaps where sustainability aspirations (e.g., installing solar panels) are hindered by technical, architectural, or regulatory barriers.
- Autonomy and Accessibility: Intersects when participants express a desire for energy self-sufficiency or more independent control over sustainable choices.
- Trade-Off Management: Connects where participants balance sustainability intentions with financial costs, complexity of installation, or household disruption.

4.Conclusions

The qualitative analysis of eight interviews revealed a complex interplay of structural, behavioural, perceptual, cognitive, and social factors shaping indoor comfort and energy practices.

A few critical insights emerged:

- **There is not a "Comfort for All"**: Participants are highly sensitive to fluctuations in temperature, airflow, and light, and their comfort strategies are closely tied to bodily and physiological conditions (e.g. respiratory ease, sensitivity to glare).
- **Trade-offs are ubiquitous**: Maintaining optimal conditions (ventilation, light, privacy, noise) often requires accepting compromises—opening windows means noise and heat loss; closing shutters improves privacy but reduces daylight.
- **Structural and technological limitations constrain comfort and energy saving**: Poor spatial design, inefficient ventilation systems, manual-only controls, and lack of automation reduce the effectiveness of even well-intentioned adaptive behaviours.
- **Energy consumption is structurally higher** for many disabled individuals due to medical devices (wheelchairs, respirators, PEG pumps, lifting equipment), leading to disproportionately high household bills.
- **Economic constraints (energy poverty) deeply influence behaviour**: Financial vulnerability forces households to limit energy use, adopt workarounds (e.g. wearing extra clothing, avoiding heating), and delay upgrades and maintenance.
- **Smart-home technologies can enhance independence**, but access is uneven. Some participants rely on Alexa, smart thermostats, or automated blinds to overcome mobility barriers, while others avoid automation due to reliability concerns or lack of familiarity.
- **Sustainability attitudes vary but are generally positive.** Some participants express strong interest in renewable energy and self-sufficiency (e.g., solar panels, off-grid living), though high costs and administrative hurdles often prevent action.
- **Resistances and subjective perceptions matter**: Beliefs about health, comfort, and technology can prevent adoption of even beneficial practices. Lack of digital literacy or distrust in smart solutions act as soft barriers.

- **Bureaucratic and structural barriers limit choice.** Participants in social housing cannot freely choose energy providers or install renewable technologies, as decisions are made at institutional or provincial levels.
- **Transparency and education are necessary**: The opacity of energy bills, variability of costs, and lack of real-time feedback make informed energy management extremely difficult, undermining empowerment.
- **Comfort is shaped by collective decisions**: Noise, building maintenance, and shared infrastructure decisions reflect how one's comfort is intertwined with neighbours and communal systems of responsibility.

5.Inputs for Training Materials

Building on the findings of this qualitative analysis, the following recommendations outline some suggested contents for the Training Materials (T3.3):

- **Understanding the Multisensory Dimension of Comfort**: modules explaining how different environmental factors (thermal comfort, visual comfort, acoustic comfort, and indoor air quality) interact to shape overall comfort. Participants should learn to recognise the interdependence of these dimensions and how small changes in one domain can affect perceptions and behaviours in others. A particular attention should be put to people with reduced mobility. Safe use of personal warming devices for vulnerable groups should also be included.
- **Trade-off Decision-Making**: Provide interactive case studies and role-play exercises that simulate real-life scenarios and DIY adaptive strategies and behaviour (e.g. deciding whether to open windows despite external noise). Introduce decision-support tools such as matrices or checklists to help people weigh the pros and cons of competing needs (e.g. comfort vs. energy savings, privacy vs. ventilation).
- **Structural Literacy and Technology Awareness**: modules on the fundamentals of building science (including orientation, insulation, and ventilation principles) and technologies relying on renewable energy to empower people with practical knowledge about how buildings influence comfort and energy use. Include simple, actionable maintenance tips (e.g. cleaning ventilation grilles, sealing air leaks) and demonstrations of relevant technologies (e.g. thermostats, shading systems).
- **Energy Literacy, Bill Transparency, and Consumption Monitoring**: modules/workshops focused on improving understanding of energy bills, teaching people how to read and interpret them line by line and distinguish between fixed and variable charges. Tools to enable fair and transparent

comparisons between energy suppliers for better decision-making. Introduce accessible tools such as spreadsheets or mobile apps to support active monitoring of daily energy consumption and develop a clearer sense of usage patterns and associated costs.

- **Overcoming Psychological Barriers**: reflective modules aimed at exploring common beliefs, fears, and misconceptions that can limit the adoption of energy-efficient practices or comfort technologies (e.g. “air movement is harmful to health”).
- **Smart Home and Assistive Technology Training**: Introductory sessions on smart-home systems (e.g., Alexa, Google Home, smart plugs, smart thermostats).
- **Collective Engagement and Shared Responsibility:** modules that address the social and governance dimensions of comfort and energy use, particularly in multi-occupancy buildings. These sessions should clarify the distribution of roles and responsibilities between tenants, landlords, and building managers, while providing strategies for collaborative decision-making, cost-sharing, and collective problem-solving.
- **Monitoring and Feedback Tools:** hands-on training in the use of affordable environmental sensors (e.g. for temperature, humidity, and CO_2) and guidance on how to interpret the collected data. Demonstrate how this feedback mechanisms can support behavioural adjustments and inform decision-making.

Regarding the form of the training materials, younger people seem to prefer easily accessible online modules and toolkits, while older people seem to prefer physical meetings and training. Physical meeting can be advertised via website. Roleplay exercises and quiz play can be also options.

6.References

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Annex A – Summary Grid (Theme x Participant)

Code	Summary
Comfort	**(P01)** Comfort is not perceived as a stable condition but as a dynamic balance between multisensory factors. It is primarily associated with breathing and air quality, attention to avoiding abrupt changes between body and ambient temperature, and visual sensitivity.
	(P03) P03 manages indoor comfort by ensuring good ventilation, creating cross-breezes between the bedroom and kitchen, and relying on the air conditioner's dehumidification function. Despite these strategies, winter remains the period of greatest discomfort. Due to heightened sensitivity to cold, the participant must maintain the home at around 22 °C—higher than the recommended 20 °C—to feel adequately warm.
	(P04) For P04, thermal comfort is a major concern particularly in winter due to reduced mobility. The indoor environment must now be kept at approximately 21.5 °C. This need exceeds recommended limits but is essential for maintaining personal comfort. In contrast, summer conditions pose fewer challenges: P04 enjoys the heat outdoors but keeps the air conditioning running continuously indoors, maintaining rooms at about 20 °C, also to support the comfort of a partner working from home.
	(P05) For P05 thermal comfort is a major concern, particularly in winter. Due to reduced mobility and difficulty keeping warm, PO5 is not feeling comfortable with indoor temperature. Both summer and winter outdoor mobility is impossible due to extreme weather. P05 also pays attention to indoor air quality, ventilating rooms during cleaning and isolating other areas of the home.
	(P06) For P06 thermal comfort is a major concern, particularly in winter. Due to reduced mobility and difficulty keeping warm, temperatures that were once acceptable (around 17 °C) are no longer sufficient, and the indoor environment must now be kept at approximately 21.5 °C.
	(P07) For P07, comfort is strongly influenced by humidity, temperature sensitivity, and limited mobility. High humidity worsens breathing and causes joint pain, making the use of a dehumidifier essential for relief. Despite living in a generally warm home, the participant often feels cold due to long periods of inactivity, and even minor draughts can cause discomfort. Fresh air is appreciated, but opening windows independently is difficult, requiring assistance from family members to ventilate the space. Light also plays an important role: natural brightness improves mood, yet adjusting shutters is not always possible

	without help, leading to frustration. Summer brings additional challenges, as heat drains energy and contributes to fatigue.
	(P08) For P08, comfort is closely connected to air quality, humidity control, and the need for a stable indoor environment. High humidity causes physical discomfort, including back pain and a feeling of heaviness in movements, making both the dehumidifier and the air purifier essential—although the former requires assistance to empty. Heat also quickly leads to fatigue, while a constant indoor temperature helps the participant move more easily and avoid stiffness. Ventilation is important for well-being, yet difficult to manage consistently, leading to sensations of stale or heavy air during long periods indoors. Light has a strong impact on mood and energy levels: bright spaces make the participant feel more alert, while darker rooms contribute to tiredness. Noise represents an additional source of discomfort when continuous, particularly traffic noise, which triggers headaches and reduces concentration.
Autonomy and Accessibility	**(P01)** Autonomy is mainly limited by the lack of human support and social opportunities. The difficulty of being heard and spending time outside the home has a greater impact than physical barriers, and disability is experienced as a condition that makes it difficult to feel fully at ease in any context.
	(P02) Autonomy is primarily restricted by chronic health conditions that cause persistent fatigue. Daily activities such as cycling become challenging, as they require significant energy expenditure that limits the ability to perform other activities throughout the day.
	(P03) For P03, autonomy in daily life is significantly shaped by mobility limitations and the need for assistance both inside and outside the home. Moving around the city has become increasingly difficult: whereas P03 previously drove independently, transitions in and out of the wheelchair now require support from another person. As a result, mobility depends on companions or specialised transport services provided by local associations, which involve administrative procedures and are not always readily accessible. Inside the home, several adaptive features—such as adjustable shelving above the sink, lowered appliances, and generally accessible layouts—enhance independence and reduce reliance on others. However, certain tasks remain impossible to perform autonomously, such as removing mould, which must be handled by a partner.
	(P04) This participant's autonomy is strongly limited by mobility impairments, especially during winter. Cold temperatures make outdoor movement difficult and often prevent them from leaving the house or driving, despite being able to operate an adapted car with a joystick. Limited public transport—particularly the absence of services

	on Sundays—reinforces dependence on private vehicles and on others for mobility.
	(P05) P05 cannot move their hands and therefore requires assistance to open windows, manage ventilation, and operate shutters. Tasks such as adjusting light levels or closing blinds must be done when an assistant is present, not necessarily when the participant would prefer. P05 express a desire for additional assistance to gain more control over daily routines.
	(P07) The participant's autonomy is constrained by limited mobility, which affects both environmental control and daily routines. Managing indoor air quality is important for well-being, as high humidity causes breathing difficulties and joint pain. However, the participant cannot move easily between rooms, relying on keeping the air clean where they spend most of their time and using a dehumidifier for relief. Accessing fresh air independently is difficult: opening windows or adjusting shutters requires assistance from family members, which limits the participant's ability to ventilate the space or control daylight according to personal preference. This lack of independence is felt emotionally, especially because natural light has a strong positive impact on mood. Temperature perception is also affected by immobility: despite living in a warm home, the participant frequently feels cold, and even minor draughts cause discomfort. While environmental controls (heating, dehumidifier) help, they require continuous management that the participant cannot fully perform alone.
	(P08) The participant's autonomy is limited by physical constraints that affect their ability to manage indoor environmental conditions independently. Although they use devices such as a dehumidifier and an air purifier to improve air quality, they rely on others for tasks like emptying the dehumidifier. Maintaining proper ventilation is challenging when spending long periods indoors, as opening windows or ensuring airflow requires effort and coordination.
Collective Responsibilities	**(P01)** The theme of collective responsibilities emerges in the perception of the shared environment: public events, such as neighbourhood festivals, can generate disturbing noise.
	(P02) The theme also arises in relation to the management of shared spaces and building maintenance. Noise from the courtyard, neighbours heard through ventilation systems, and frequent renovation works highlight how domestic well-being also depends on the behaviour and decisions of others. Furthermore, the question of who should bear the cost of improvements — tenant, owner, or

	condominium — is perceived as ambiguous and unresolved, indicating an unclear distribution of responsibilities.
	(P03) P03 describes increasing difficulties in accessing financial support and disability-related services from municipality. Assistance often comes with strict limitations, offering equipment that is inadequate or not suited to actual needs. Bureaucracy adds another burden: procedures are slow, complex, and time-consuming. For this reason, the participant prefers to request help only when absolutely necessary, otherwise managing independently as long as employment and income allow it. The future, however, is perceived as increasingly challenging. The participant cannot choose the most advantageous gas or electricity provider, since all contracts are determined directly by the provincial housing authority (ITEA). As a result, individual choice is limited, and energy decisions are made entirely at the institutional level.
	(P05) The participant lives in a home with an independent boiler system. Although, in principle, the housing company is responsible for replacing the boiler when it is no longer functioning properly, this rarely happens in practice. Each time the participant calls a technician due to a malfunction, the issue is addressed by replacing individual parts rather than installing a new boiler. As a result, the participant feels that necessary upgrades are repeatedly postponed, despite ongoing problems.
	(P08) The participant acknowledges that support services do exist but often require coordination with others in the condominium, making them difficult to access. Living in a shared building complicates procedures and limits individual autonomy.
Skills and Abilities in Energy Management	**(P02)** Household energy management is characterised by a lack of transparency and comprehensibility. Bills are perceived as “mysterious” and difficult to interpret, making it complex to understand how much is consumed and what is actually being paid for. The lack of specific knowledge is seen as a significant barrier, alongside economic limitations, hindering informed decision-making both in daily management and in more structural housing decisions. Participants express the need for simple and accessible tools to monitor consumption in real time, set energy budgets, receive alerts when thresholds are exceeded, and access services that allow comparison of providers and evaluation of the most sustainable and cost-effective options. Finally, they emphasise the importance of clear information when purchasing or renovating a home to make effective decisions about indoor comfort.
	(P04) P04 finds utility bills much harder to understand than older telephone bills, which used to be more straightforward. Today,

	additional charges—such as transmission fees and other unclear costs—make interpretation difficult.
	(P05) Energy bills are a major source of confusion and frustration. After months of receiving credit and paying almost nothing, the participant was surprised by an €85 electricity bill—especially since P05 now lives alone and expected lower costs.
	(P07) The participant expresses a strong preference for clear information and patient guidance. They feel that what would help most is having someone available to explain things calmly and thoroughly, allowing them to feel more independent and confident in making energy-related decisions. Although their son occasionally explains things, he does not always have time to go into detail. Regarding renewable energy technologies, the participant has little knowledge about options such as photovoltaic panels or heat pumps. While aware that their son sometimes mentions these topics, they do not fully understand them and have not installed any such systems.
	(P08) The participant has a strong interest in technology and views it as a valuable tool when used effectively. As an IT enthusiast, they feel confident navigating digital systems and devices.
Design and Technological Limitations	**(P01)** The layout of the spaces — with the living room facing south and large windows, and the bedrooms facing north with smaller openings — is perceived as effective in ensuring natural thermal comfort.
	(P02) The dwelling presents numerous critical issues related both to design and the absence of advanced technological solutions. Heating and ventilation are managed through outdated, manual systems (e.g., a simple rotary thermostat or noisy fans connected to the light switch) without automated temperature or schedule controls. Design choices negatively affect comfort: limited exposure, poor natural ventilation, recurring mould and condensation require frequent window opening even in winter, reducing energy efficiency. Additionally, spatial constraints — such as hard-to-reach windows and partially usable openings — further limit the usability of spaces.
	(P03) The participant faces difficulties managing mould and indoor humidity due to limited physical ability. Mould removal is handled by their partner, as they cannot do it themselves. Heating control is also restricted because the system is centralised. Although a thermostat is installed inside the flat, its placement in the kitchen—one of the warmest rooms—prevents proper regulation of temperatures in other areas, particularly the bedroom, which remains cold.
	(P04) The participant explains that their balcony receives very little sunlight due to its orientation, making small balcony solar panels

	impractical. The energy they would produce—mainly in summer—would not justify the installation cost. To reduce heat loss, the participant recently replaced the window frames, addressing issues of thermal dispersion. However, the home has windows on only one side, preventing effective cross-ventilation.
	(P08) The participant has made several investments to improve the home's energy efficiency, including installing double glazing and more insulated windows. These upgrades have noticeably improved thermal comfort—helping the house stay warmer in winter—and reduced outdoor noise. Although the initial motivation was financial savings, the participant later realised that these improvements also enhanced overall well-being. Over the years, they have continued to upgrade the home to increase efficiency and comfort.
Resistance and Subjective Perceptions	**(P01)** Resistance to adopting technological comfort solutions stems mainly from subjective perceptions related to health and well-being. Fans are avoided because moving air is considered harmful for cervical health, and the noise is perceived as annoying.
	(P02) The main barriers derive from personal conditions, limited familiarity with technology, and value-based concerns. Chronic illnesses and resulting fatigue reduce the ability to perform daily activities such as cycling. Lack of experience with smart home systems generates uncertainty, while devices such as voice assistants are avoided due to privacy concerns. Additionally, the complexity of understanding energy bills and the perception of poor design choices fuel frustration and distrust toward existing housing solutions. Finally, strong environmental awareness ("climate anxiety") shapes preferences towards more self-sufficient and sustainable housing models.
	(P03) The participant acknowledges the capabilities of smart home technologies. However, they prefer not to rely on such systems because of concerns about power outages.
	(P05) P05 prefers manual thermostats, as past experiences with automated settings led to unpredictable behaviour—heating turning on at night and off during the day.
	(P07) The participant has not installed an air conditioner yet. Although their son is encouraging them to do so, they are hesitant, fearing that it might make the indoor environment too cold.
Energy Poverty	**(P02)** Energy poverty is linked to both financial insecurity and high condominium costs. Heating remains switched off because it is economically unsustainable, forcing adaptive strategies such as limiting hot water use or drying clothes outdoors even in winter. These difficulties affect daily comfort and basic domestic activities. Although access to reimbursements based on a low ISEE is possible, expense

	management remains complex and a source of frustration. The economic dimension is perceived as the main barrier to achieving more self-sufficient and sustainable housing models.
	(P03) When asked about what type of support could make access to energy easier, the participant points directly to financial assistance.
	(P04) They strongly believe that electricity and gas bonuses should be available and expanded for people with disabilities, especially those with low or medium-low incomes. To avoid unexpected and unaffordable winter bills—such as a €300 gas bill they once received—the participant opted for a fixed monthly payment plan, accepting slightly higher summer costs in exchange for stability throughout the year.
	(P05) The participant experiences high energy consumption due to essential medical and mobility-related devices such as an electric wheelchair, a lifting aid, a night-time fan, and a PEG pump. They note that many other disabled people face similar or even greater burdens, especially those using respiratory equipment that significantly increases electricity use. As a result, energy bills for people with disabilities can be disproportionately high.
	(P06) While the participant manages financially thanks to a pension and an accompanying disability allowance, they recognise that many others are not as fortunate—particularly those with severe disabilities or limited work histories.
	(P08) The participant must use specially adapted equipment to drive, which significantly increases the cost of purchasing a vehicle. Although they live alone, the participant is careful with energy consumption and billing, as they also support two children in university. They try to balance comfort with affordability: in winter they want to keep the home warm and welcoming, but worry about driving the bills too high. They are considering installing solar panels, but high upfront costs and complex bureaucratic procedures make the decision difficult.
Managing Trade-Offs	**(P02)** Domestic life is characterised by constant compromises between conflicting needs. For example, keeping windows open reduces humidity and prevents condensation but causes heat loss, while keeping them closed ensures privacy and reduces noise but worsens ventilation and thermal comfort. Similarly, lowering blinds improves privacy but reduces natural light. Drying clothes outdoors prevents internal humidity but is inconvenient during winter, and the need to protect pets further limits the possibility of airing the home.
	(P04) Living near semi-rural areas requires mosquito screens, which makes ventilation more difficult.

	(P06) The participant recalls that when living in the city centre, ventilation was difficult due to heavy traffic and exhaust fumes, which made opening windows unpleasant.
Adaptation and Behavioural Strategies	**(P01)** Adaptation to environmental conditions occurs through a combination of technological choices and everyday strategies. During summer, air conditioning is considered essential to improve air quality and facilitate breathing, while in winter thermal comfort is provided by radiators and stoves without the need for additional interventions. Daily activities are organised adaptively: outings are planned during the cooler hours of the day, avoiding midday, and the beneficial features of the dwelling — such as the balcony and nearby green spaces — are exploited.
	(P02) Adaptation mainly involves practical, low-cost strategies. Ventilation and lighting are managed with simple solutions, such as partially lowering shutters to protect pets and reduce heat or light entry, or opening windows to limit condensation. During summer, passive measures — the use of fans, umbrellas, time spent on the balcony, cold baths, and bowls of cold water — are adopted to reduce thermal discomfort in the absence of air conditioning. In winter, adaptive behaviours include wearing multiple layers of clothing and ventilating only when necessary.
	(P03) The participant explains that there is little room to further reduce energy use in winter. They already wear heavier clothing, but cannot avoid turning on the heating due to their needs.
	(P06) The participant relys on various personal heating devices—such as a rechargeable electric shawl and hand warmers—to stay comfortable.
	(P07) The participant has adapted their habits to reduce heating use, choosing to keep the thermostat lower than in the past. To stay warm, they now compensate by dressing more warmly and using blankets, such as covering their legs.
Domotics	**(P03)** The participant uses some smart-home features, mainly for lighting and partially automated blinds. They control the lights through Alexa using voice commands, and some blinds operate with a wall-mounted button.
	(P04) The participant uses an extensive set of smart-home technologies. In addition to Alexa, they have a Netatmo hub that controls most of the lighting, along with a few extra smart lights. All blinds are electric, making it easy to raise and lower them, and all household lights are domotic, allowing full control over switching them on and off.
	(P08) The participant has increasingly adopted smart-home technologies to improve energy efficiency and personal autonomy. They have become more careful with energy use, turning off appliances when

	not needed, supported by digital apps. Installing a smart thermostat has reduced consumption and eliminated the need to move physically to adjust temperature settings. Motorised blinds and phone-controlled air-conditioning have similarly enhanced daily convenience.
Attitude Towards Sustainability	**(P02)** The participant expresses a clear interest in renewable energy and energy self-sufficiency. They appreciate that their current energy provider, Dolomiti, claims to use renewable sources—one of the reasons they chose to keep the contract after transferring it. Beyond practical considerations, the participant is personally motivated by environmental concerns and climate anxiety. They describe an aspiration for a fully self-sufficient lifestyle, imagining living in an off-grid cabin in the woods.
	(P07) The participant adopted LED lighting with help from their son and has noticed a slight reduction in energy costs. Although they do not fully understand technical aspects, they feel positive knowing that this change benefits the environment, reinforcing a sense of doing the "right thing."
	(P08) The participant is strongly interested in renewable energy and the idea of a sustainable, self-sufficient home. They have requested quotes for solar panels and are still considering installation, but high costs, required home modifications, and bureaucratic procedures have prevented them from proceeding so far.

Annex B – Coding System (Examples)

This appendix contains examples of the coding framework derived from the reflexive thematic analysis of the qualitative interviews conducted within Task 2.2 of the ASSERT project. It includes some examples of excerpts used during the analytic process, the assigned codes, and their associated thematic categories. The verbatim quotations (*Excerpts*) are translated from Italian into English.

Excerpt	**Participant**	**Code**	**Theme**
"My wife drives and accompanies me."	P01	Family support	Autonomy and Accessibility
"The car has 40 km of range. That's the problem."	P01	Limited autonomy	Autonomy and Accessibility
"It's 3 kW... the battery is lithium and holds charge, but it only has 40 km of range and I can't find charging stations... every gas	P01	Inadequate infrastructure	Autonomy and Accessibility

station should have a paid charger, accessible day and night."			
"Living room south with large glazing; bedrooms north with smaller windows."	P01	Spatial orientation	Design & Technological Limits
"What's needed is human support… if I listen to your problem, your burden is already half."	P01	Human support	Autonomy and Accessibility
"After the brain surgery… some 'roads' are interrupted; I hear questions but can't always respond."	P01	Communication disturbance	Autonomy and Accessibility
"Artificial light doesn't bother me; sun glare does. My right eye tears sometimes."	P01	Glare discomfort	Comfort
"During the Sant'Angelo festival the music echoed and was annoying."	P01	External noise	Collective Responsibilities
"We don't use fans; air currents are bad for the cervical spine, and they're noisy."	P01	Negative effects of fans	Resistance & Subjective Perceptions
"If it's 33–34°C outside, I set 20–22°C… too big a gap from body temperature isn't good."	P01	Preferred temperature	Comfort
"Mornings outside, then the park… midday is hardest for heat. We're lucky: open view, big balcony, a park."	P01	Heat management	Adaptation & Behavioural Strategies
"When you're disabled there's no place you feel 'very' well—just 'fine' at best."	P01	Needs pyramid	Autonomy and Accessibility
"In winter, mould formed near the windows; a small grille to the balcony kept letting air in."	P02	Damp & mould	Design & Technological Limits
"Because of mould we had to keep windows open, especially when boiling food, to avoid condensation."	P02	Window opening	Adaptation & Behavioural Strategies

"For one or two years we couldn't afford heating because condo bills were very high."	P02	Energy poverty	Energy Poverty
"So we just wore an extra sweater."	P02	Adaptive strategy	Adaptation & Behavioural Strategies
"There was one thermostat for three radiators; we kept it off most of the time."	P02	Heating habits	Energy Poverty
"In summer almost no air passed through."	P02	Poor ventilation	Design & Technological Limits
"Through the kitchen ventilator we could hear neighbours."	P02	Noise through vents	Design & Technological Limits
"We had an extracting hood, but it was very noisy and small."	P02	Hood noise	Design & Technological Limits
"We often stayed on the very liveable balcony; we took cold baths and soaked our feet in bowls of water."	P02	Cooling strategies	Adaptation & Behavioural Strategies
"We eventually bought an umbrella."	P02	Shading	Adaptation & Behavioural Strategies
"We kept shutters down, leaving small openings to block direct sun."	P02	Overheating prevention	Adaptation & Behavioural Strategies
"Keeping shutters down and facing an internal courtyard made the apartment rather dark."	P02	Reduced visual comfort	Managing Trade-Offs
"Neighbours often did renovation works—drilling, hammering."	P02	Construction noise	Collective Responsibilities
"We had a very low ISEE and could request reimbursements for some condo fees."	P02	Financial relief	Energy Poverty
"I don't really know how to read a bill or understand my consumption."	P02	Bill literacy	Energy Management & Informed Choices

6.2.5 Spain

Report – Spain – Focus Groups T2.2

1.Introduction

This report presents the outcomes of Task T2.2 of the ASSERT project, which involved the organisation and implementation of two focus groups by Ecoserveis. The activity was designed to gain an in-depth understanding of the energy needs, expected indoor comfort conditions, and everyday energy-related practices of individuals with disabilities who are experiencing energy poverty.

2.Methodology

The first focus group was conducted in person on September 10, 2025, in Barcelona, while the second focus group took place online on October 9, 2025.

2.1.Participants

To reach the participants, Ecoserveis contacted four Disabled People's Organizations (DPOs) involved in the project: Sindicat de Mares en la Diversitat Funcional (Mothers' Union for Functional Diversity), ECOM, Esplugues sense Barreres (Esplugues Without Barriers), and Àuria Grup. The DPOs then reached out to potential participants, while Ecoserveis managed the invitations, consent form signatures, and administration of the survey.

The first in-person focus group took place on September 10th 2025, attended by five participants. Four of them were mothers of children with functional diversity, who offered valuable insights into their experiences. The fifth participant was an individual with a physical disability.

For the second focus group, which was held online on October 9th 2025, Àuria Grup invited five participants with intellectual disability. These individuals live independently but require assistance with managing and paying for housing services, which Àuria Grup supports (specifically, one participant has their energy bills covered by the DPO, while the others are responsible for their own energy bills). The focus group session was conducted in a room at the Àuria Grup building, with two social workers assisting the discussion.

The DPO Esplugues sense Barreres initially expressed interest in providing participants for the second focus group. However, they ultimately did not have any available participants for the session.

As an incentive for participating, Ecoserveis provided attendees with a small, compact fan.

2.2.Survey administration

An online survey was administered to each participant using the EU Survey platform (https://ec.europa.eu/eusurvey), with a paper version available as an alternative. The original questions in English were translated into Catalan and Spanish. The survey was initially available to participants two weeks before each focus group. However, in some cases, this timeline was not followed due to late confirmations of attendance from specific participants.

For the first focus group, three participants completed the survey one week before the session. One participant filled out the paper version during the session because Ecoserveis received late confirmation of her participation and she did not have access to a computer. Additionally, one participant was unable to complete the survey due to personal circumstances. Ecoserveis deployed efforts to provide alternatives and support for this individual. However, due to her vulnerable situation and the seriousness of the incident, she was unable to respond to the survey.

For the second session, participants confirmed their attendance only two days before and were unable to access a computer. Consequently, the surveys for this group were completed two weeks after the focus group.

2.3.Procedures and timing

For the first focus group, Ecoserveis selected an accessible and well-located venue to ensure easy and comfortable access for all participants. The session lasted three hours and followed this structure: an introduction, three discussion rounds, and a conclusion. One facilitator led the discussion, while another individual was responsible for taking notes. To support the debate, three additional members from the Ecoserveis team participated, providing clarification and posing specific questions when necessary.

Each discussion round was initially planned to last about 45 minutes. However, the first round extended to approximately 55 minutes due to the number of topics and questions raised. As a result, the final discussion round was shortened by 10 minutes since many topics had already been covered in previous rounds. Although the session was recorded, technical issues led to poor audio quality, making a complete transcription unfeasible. However, some segments of the recording are clear enough for review if needed.

For the second focus group, Ecoserveis organised a Zoom meeting led by one facilitator, supported by a second person for reporting and two additional team members to address questions and provide clarification. All five participants met in a room at the Àuria Group's building, with assistance from two social workers from the organisation. The DPO indicated that this session lasted two hours, as previous experience showed it was more conducive to maintaining participants' attention during the discussion. Each round of debate lasted approximately 35 minutes. While the entire session was recorded, poor audio conditions in the room made complete transcription impractical. Nevertheless, several parts of the recording are available for full review if necessary.

2.4.Thematic analysis

The thematic analysis was conducted manually, following the detailed methodology outlined in the ASSERT toolkit to ensure rigour and consistency throughout the process.

Upon completing the focus group discussions, the data analysis phase started with an in-depth familiarisation with the collected data. This first step involved comprehensively reading and re-reading the notes taken during the sessions, as well as listening to some parts of the audio recordings. During this immersion in the data, recurring ideas, patterns, and particularly significant points emerged, which would inform the subsequent analysis.

The next phase involved open coding, a process in which sections of the previous notes were labelled using relevant keywords or categories. This involved carefully assigning significant words, phrases, and codes to the recurring concepts found within the data set. As a result, multiple codes encapsulated the main issues highlighted by participants, providing a foundation for deeper analysis.

Following the coding process, the next task consisted of grouping similar codes to form broader, interconnected themes. This stage involved identifying patterns among the codes, organising similar ones under comprehensive themes, and seeking relationships that could provide more profound insights into the data. Each identified theme was then accompanied by a descriptive name, a detailed explanation, and illustrative examples drawn directly from the empirical data.

To enhance the clarity and transparency of the analysis, one appendix is included with this document, which expose how the raw data were organised into thematic analysis. Appendix A presents the identified themes along with descriptions and paraphrased contributions from participants.

3.Results

Description of the human sample

As previously noted, 10 participants took part in the focus groups, and 9 completed the survey. In the first in-person focus group, one participant was unable to complete the survey due to personal circumstances.

Overall, four participants reside in Barcelona, while five live in Igualada, a city located about 55 km west of Barcelona in the interior of Catalonia. This distribution corresponds to the organisation of each focus group: the first was conducted in person in Barcelona, and the second was held online, with support from the DPO in Igualada.

The majority of participants were female (six), and the age distribution was even across the groups. In the first focus group, four participants were mothers of children with functional diversity, some of whom represented their children who were under 18 years old. In terms of education level, most participants (five) had a primary education. Among them, two were from the first focus group (the participants under 18 years old), while the other three were from the second focus group.

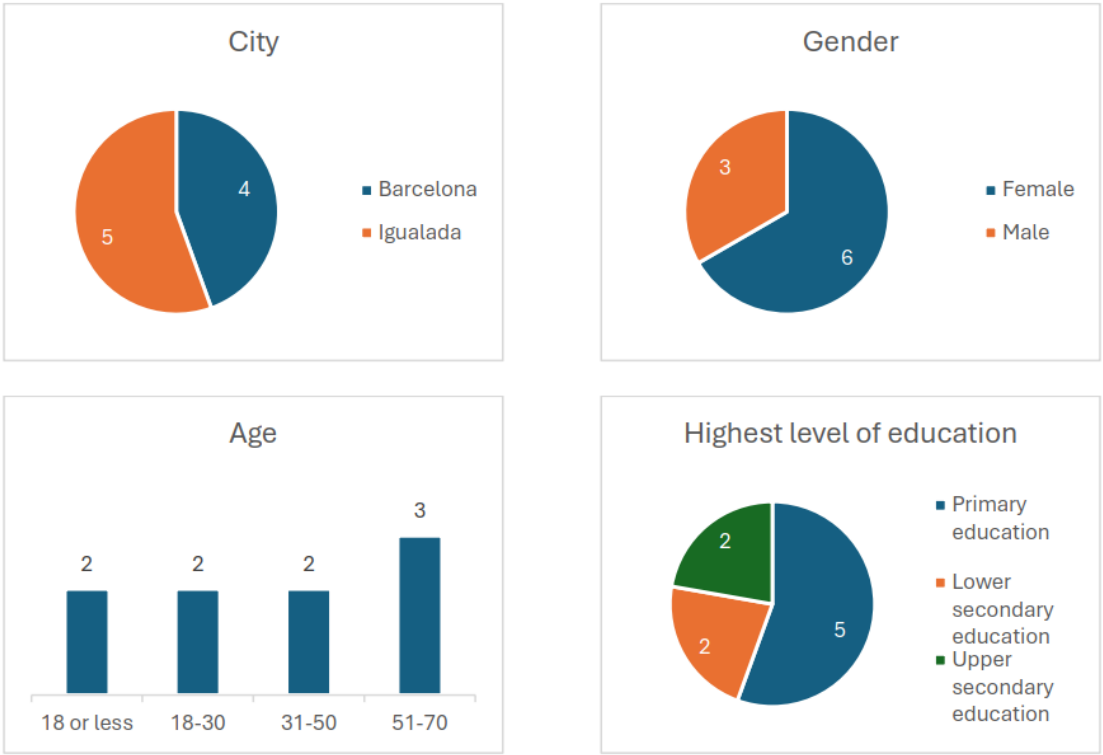


Figure 5 General information

In terms of disability type, four participants reported having cognitive or intellectual disabilities, while two have physical disabilities (one of whom also has a psychosocial disability). Three participants chose not to disclose their disabilities. Additionally, three participants reported having other illnesses or health conditions.

Regarding household income, the distribution across income levels was even, although two participants preferred not to answer the question. Most participants live with family, two live alone, and two live with roommates. The latter group consists of four individuals selected by the Àuria Grup, who have intellectual disabilities and live independently with support from the DPO.

Overall, four participants reported occasional assistance with daily activities, two receive regular assistance, and one is fully independent. The two individuals who are entirely dependent on a caregiver are both under 18 years of age and have cognitive or intellectual disabilities.

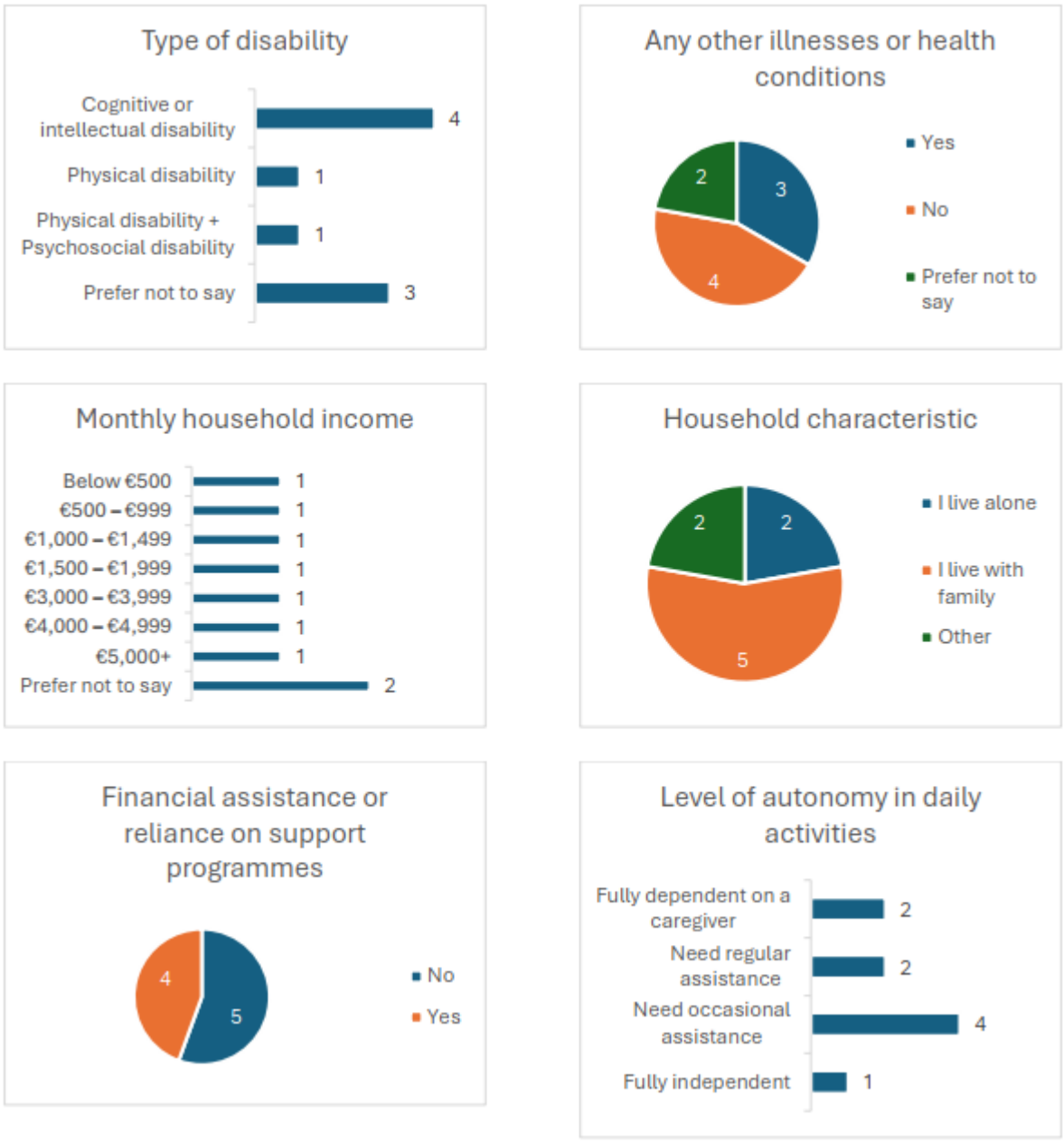


Figure 6 Additional general information

In terms of living conditions, four participants reported experiencing extreme heat during the summer, while two mentioned facing both extreme heat and extreme cold. In contrast, three participants described the temperatures as moderate. This perception is not linked to the participants' locations, as responses varied across the two focus groups held in Barcelona and Igualada.

Almost all participants live in apartments within multi-story buildings, with only one person residing in a single-family house in Igualada. Most participants indicated that their homes were built before the 1980s. Specifically, four

participants stated that their dwellings were constructed between 1950 and 1979, and one mentioned that theirs was built before 1950.

The majority of the apartments are relatively small, measuring between 30 and 59 m², while one participant lives in a more spacious dwelling of over 150 m², which is a single-family house. Regarding energy certification, most participants are unaware if their homes had one. Only one person is knowledgeable about this aspect, mentioning that their home has a certificate rated D for energy efficiency.

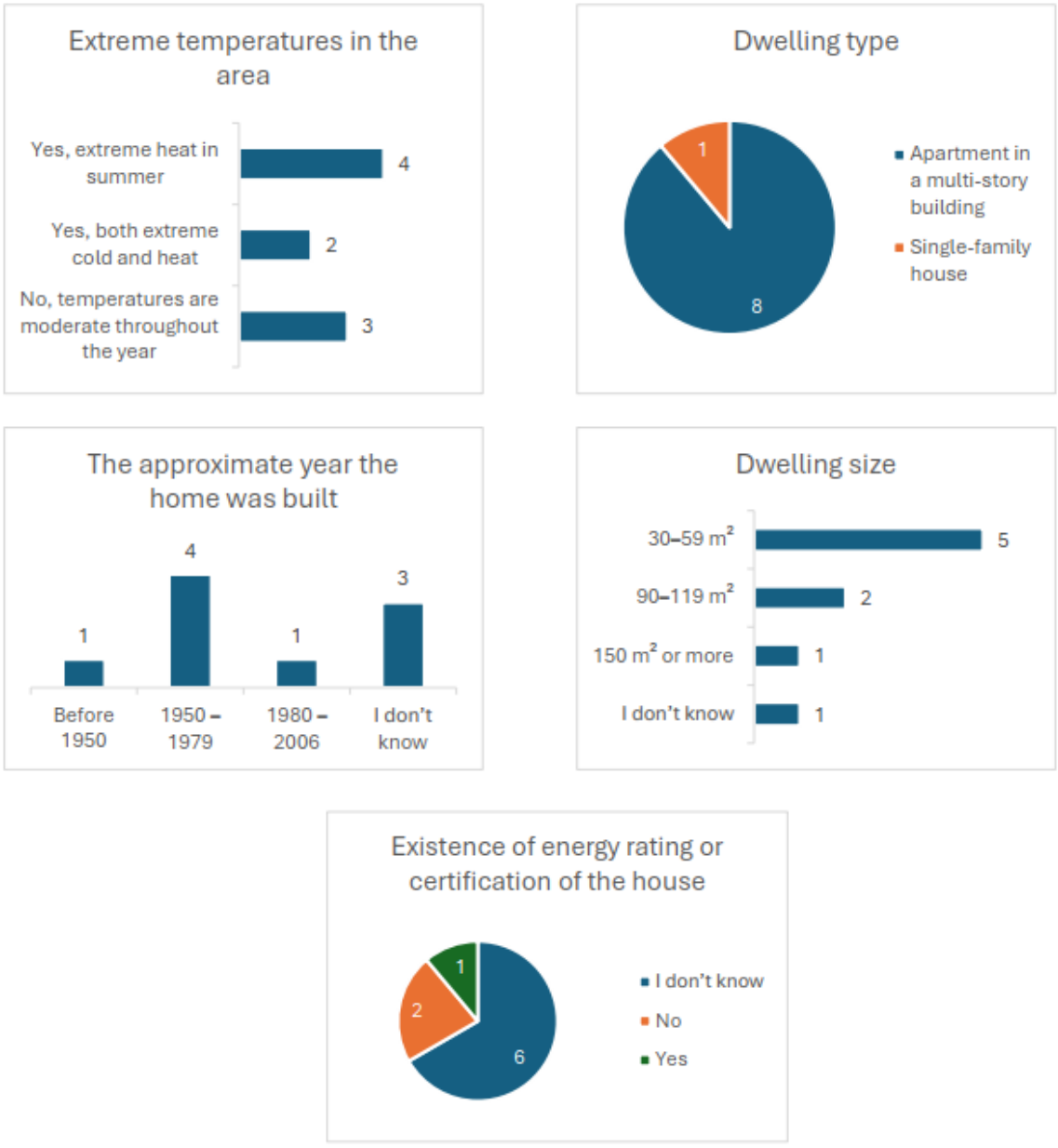


Figure 7 Dwelling and home

The main characteristics of energy-efficient dwellings include double or triple-glazed windows, good insulation, and air conditioning or cooling systems, which were noted by more than half of the participants. Additionally, several participants mentioned using a central heating system and high-efficiency appliances, with four specifically referencing these features. To a lesser extent, some issues were raised: two participants commented on air infiltration through drafty windows or doors, and one participant highlighted the need for better insulation and mentioned having an old or inefficient heating system.

When asked about renewable energy solutions used at home, only three participants provided examples. Two of them mentioned using heat pumps, while one mentioned energy-efficient appliances.

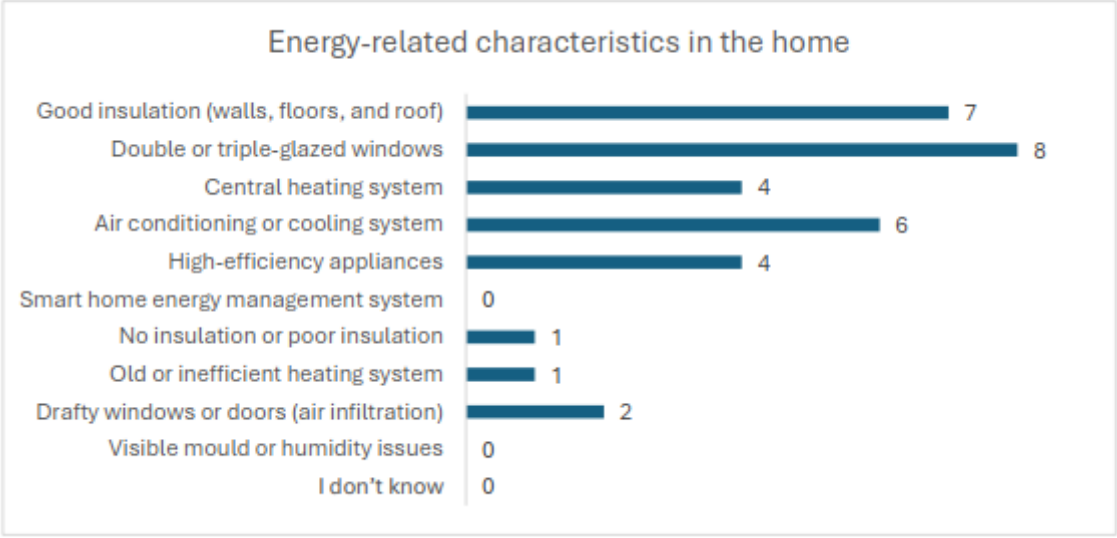


Figure 8 Energy-related characteristics in the home

Regarding electricity expenditure, most participants reported spending between €50 and €99, while two individuals indicated they were unaware of their expenses. When comparing winter and summer energy consumption, three participants reported a decrease in their expenditures, two maintained the same level, and two reported an increase.

Regarding gas consumption, six participants reported their expenditures. Of these, two spent less than €50, two spent between €50 and €99, and one had a significantly higher expenditure in the range of €150 to €199, although one participant was unsure of their values. Between the winter and summer periods, three participants reported consistent expenditures, while two reported decreases.

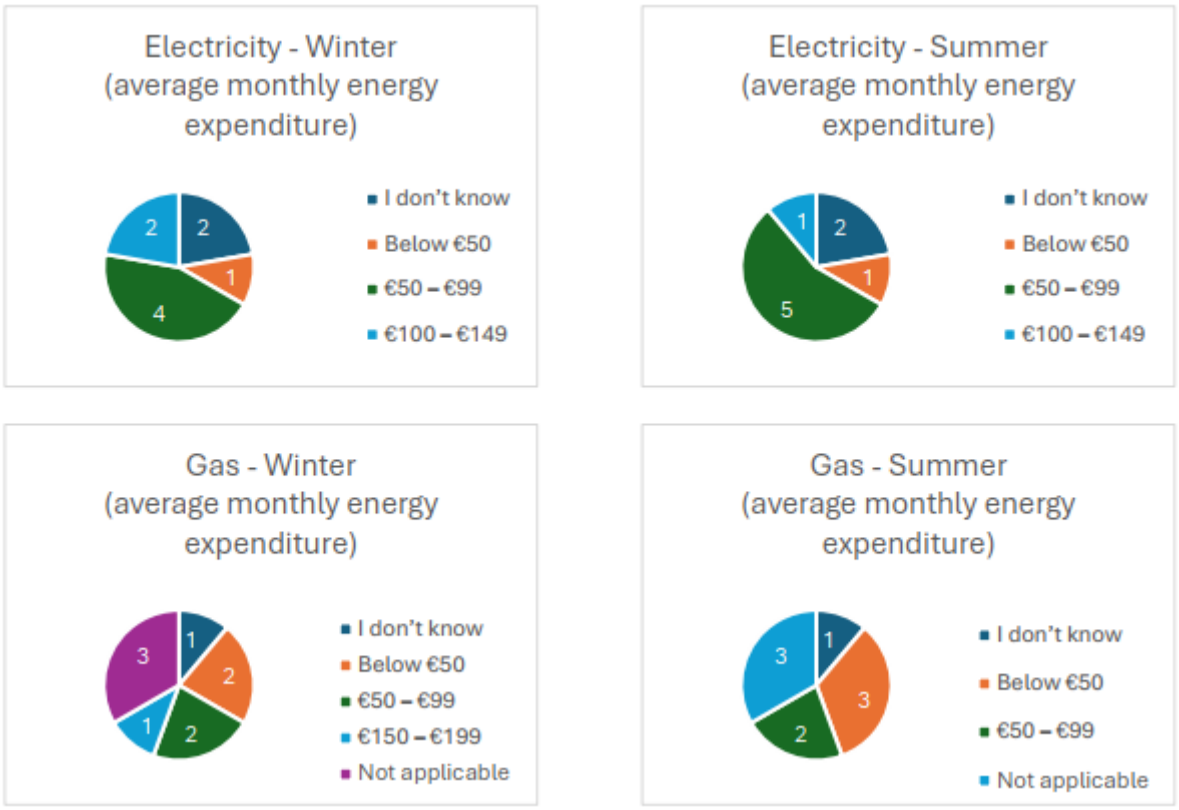


Figure 9 Energy expenditure

During the summer, most participants expressed that they cannot afford to keep their homes adequately cool. In contrast, during the winter, only one person reported difficulty in maintaining a warm home. On the other hand, none of the participants reported being late on payments in the past 12 months, as they have consistently paid their utility bills for their main dwelling on time. Additionally, regarding issues such as leaks, dampness, or rot in their homes, two individuals reported noticing a minor presence of these problems.

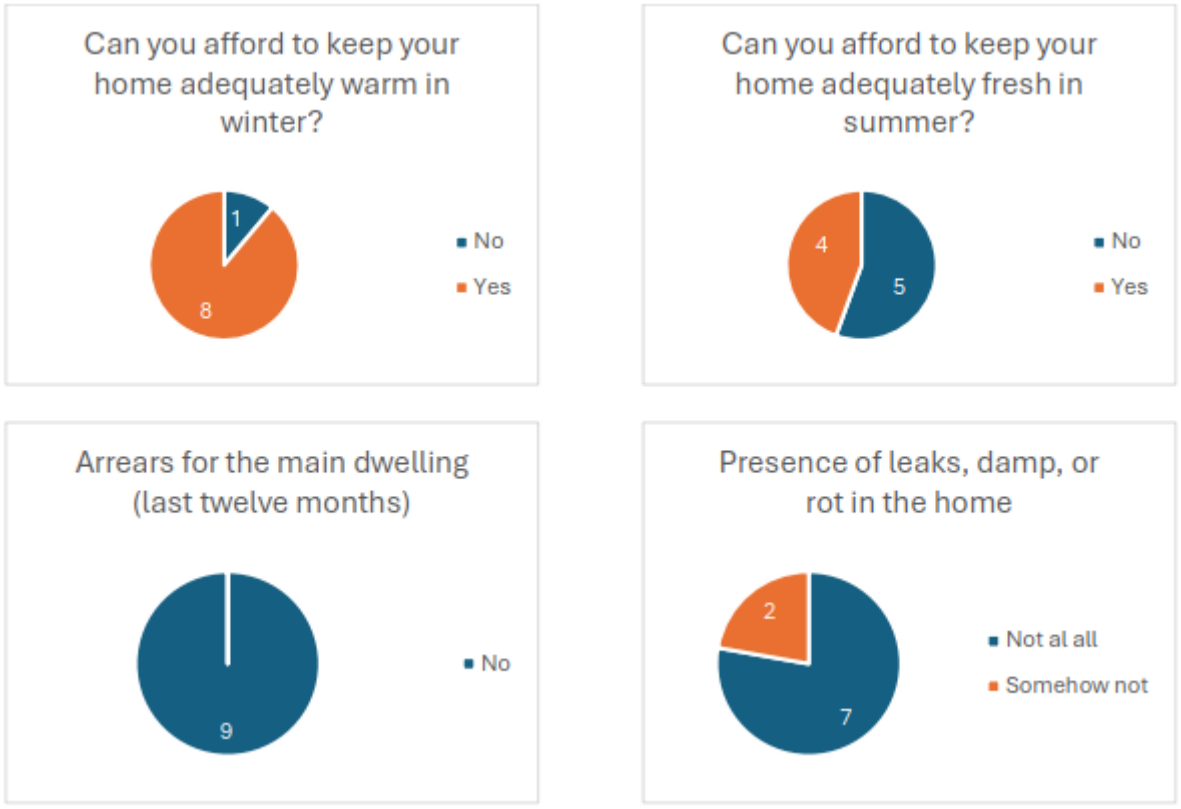
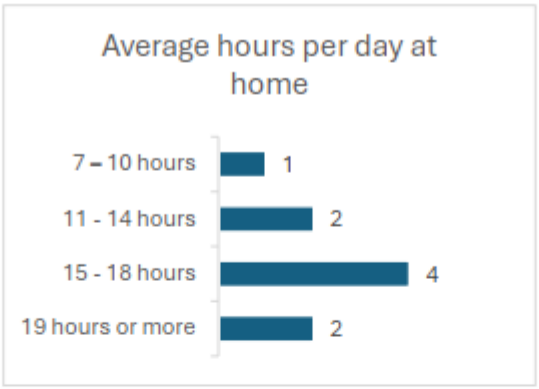


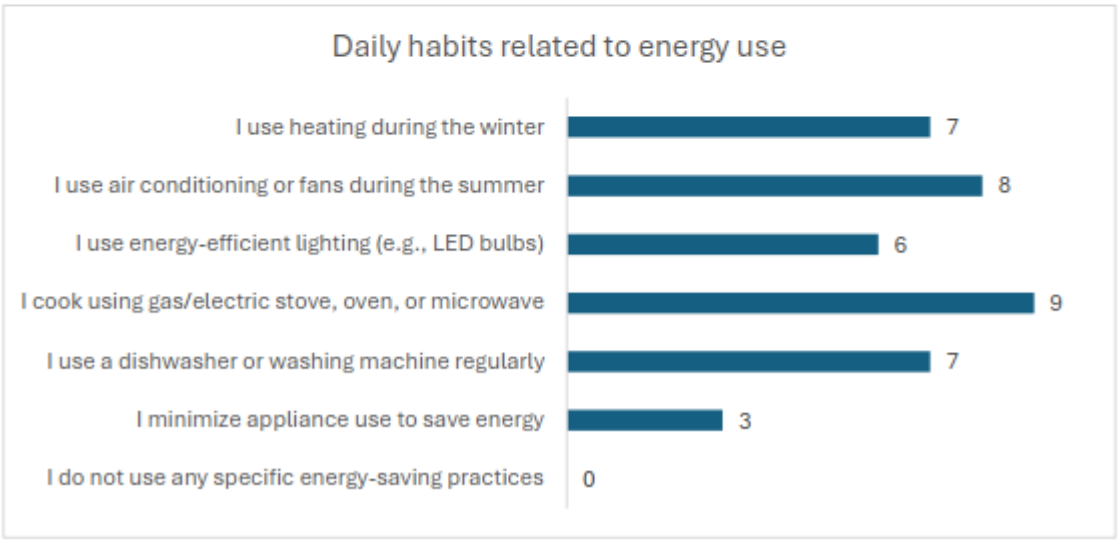
Figure 10 Energy consumption

With reference to energy practices, most participants reported spending an average of 15 to 18 hours a day at home. About daily energy consumption habits, all participants reported using either a gas or an electric stove, oven, or microwave. Additionally, a majority stated that they utilise air conditioning or fans during the summer months and heating during the winter. Interestingly, only three participants mentioned trying to minimise appliance use to conserve energy.

The most commonly suggested energy-saving measures included lowering heating or cooling settings during off-peak hours, turning off lights and appliances when not in use, and insulating windows and doors. Notably, none of the participants mentioned adopting solar panels or other renewable energy solutions.

In terms of maintaining a specific temperature in the home due to a disability, none of the participants reported that need. Similarly, no one reported having difficulty accessing public transport.





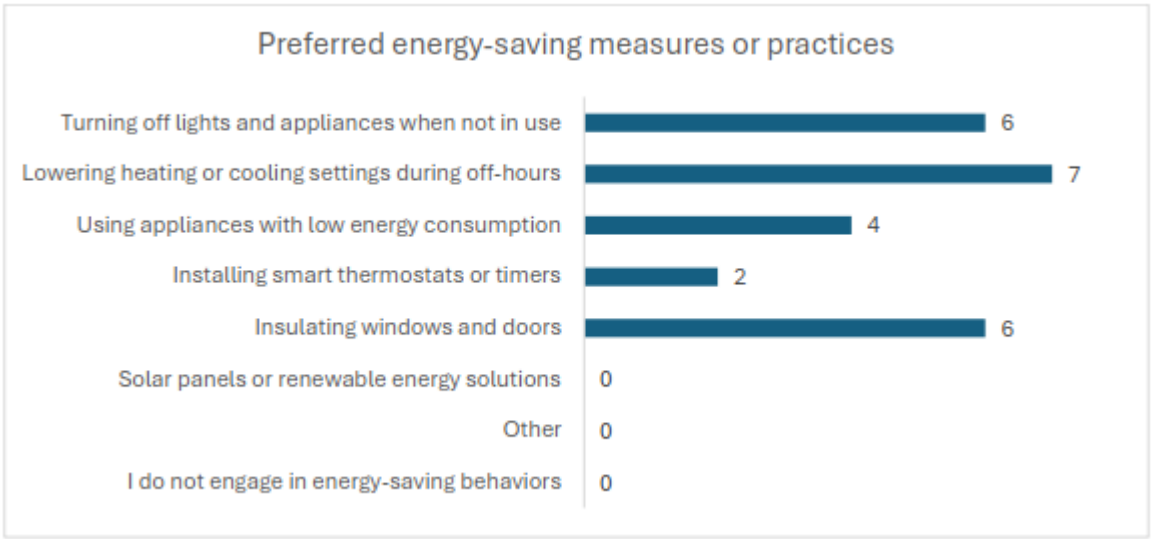


Figure 11 Energy practices

Most participants expressed satisfaction with the various aspects of indoor comfort. More than half of the respondents reported being satisfied or very satisfied across all evaluated dimensions. When considering temperature comfort, there is a slight difference between summer and winter. In the summer, two individuals reported slight dissatisfaction, and one reported discomfort. In contrast, during the winter, only one person expressed slight dissatisfaction, while two others reported a neutral feeling, neither satisfied nor dissatisfied.

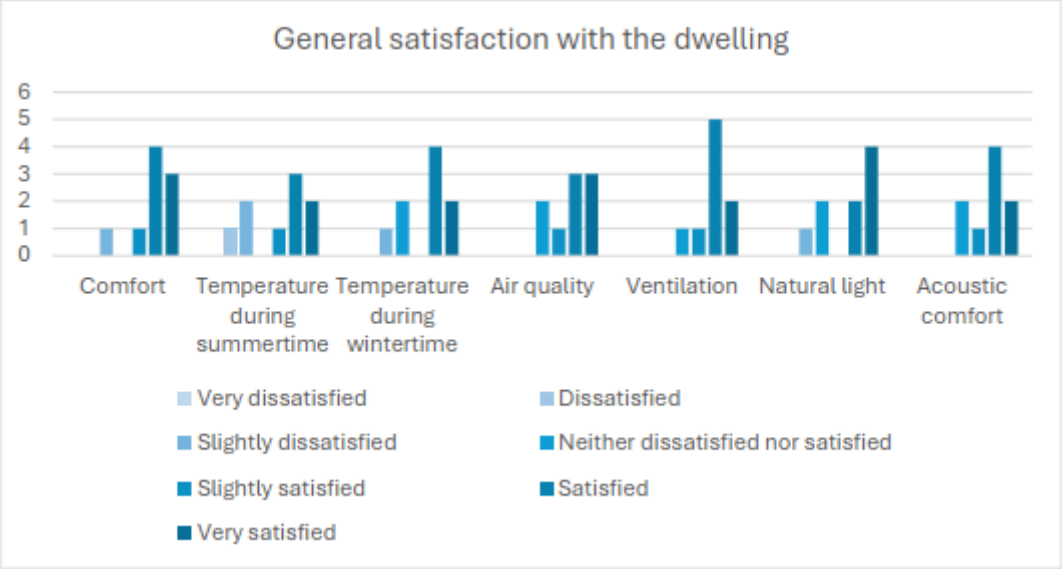


Figure 12 Indoor comfort

Thematic Analysis

Summer heat is the primary comfort issue

In general, comfort issues within homes tend to be more prevalent during the summer months compared to winter. One of the primary challenges faced by residents is maintaining a cool and pleasant indoor environment during periods of extreme heat. Some participants have reported that their rooms can reach sweltering temperatures of 40 °C during heatwaves, which can be both uncomfortable and potentially harmful to health.

To tackle this problem, some individuals opt for ceiling fans over air conditioning units. They often find ceiling fans to be a more comfortable and cost-effective solution for cooling their spaces. Ceiling fans can help circulate air and create a windchill effect, making it feel cooler even when temperatures remain high. However, during particularly intense heatwaves, the effectiveness of ceiling fans

may diminish, leaving some residents struggling to achieve a comfortable indoor temperature.

Moreover, it has been observed that one or two participants were unsure about the feasibility of installing ceiling fans in their homes, especially in false ceilings. They may require guidance on the installation process, as well as advice on whether their existing ceiling structure can support the additional weight and mechanical components of a fan. This uncertainty highlights the need for technical support to help homeowners evaluate the option of installing ceiling fans and make informed decisions about improving their indoor comfort during the summer months.

Challenges associated with the installation and utilisation of air conditioning systems

The installation of air conditioning can present significant challenges for accessibility and comfort, particularly for individuals with disabilities. A common issue arises when air conditioning units are positioned in locations that do not adequately align with the areas where cooling or heating is most required, such as living spaces, bedrooms, or areas frequented by those with mobility impairments. Consequently, the air conditioning system must run for extended periods to circulate air to different rooms, which not only disrupts comfort levels but also leads to increased energy consumption and higher utility bills.

In situations involving centralised air conditioning systems, regulating the temperature in individual rooms becomes particularly problematic. These systems typically control the air temperature uniformly across large areas, making it challenging to maintain a comfortable temperature in smaller or less-used spaces. This inefficiency can result in unnecessarily high energy usage, which may prompt residents to depend on alternative cooling solutions, such as radiators or portable fans. While these alternatives can provide some relief, they often fail to deliver the same level of comfort and may lead to uneven temperature distribution throughout the home.

Furthermore, another factor that exacerbates energy inefficiency is the common practice of leaving windows open while the air conditioning system is in operation. This can allow warm air from outside to enter, for instance, forcing the air conditioning unit to work harder to maintain a consistent temperature. As a result, this behaviour not only increases electricity consumption but also undermines the purpose of an air conditioning system, which is to provide a controlled and comfortable indoor climate.

In summary, careful consideration of air conditioning unit placement, temperature regulation, and window management is essential for ensuring both comfort and energy efficiency, particularly for households with individuals who have disabilities.

The impact of indoor environments on health

Various impacts on health and personal well-being were identified, particularly linked to the high temperatures experienced during the summer months. The effects discussed included increased irritability, a sense of general malaise, and the exacerbation of menopausal symptoms. These health concerns collectively influence mood, disrupt sleep patterns, and diminish overall quality of life, especially during prolonged periods of extreme heat.

In the first focus group, most participants agreed that Barcelona suffers from higher levels of humidity compared to other regions situated further inland. Despite this perception, there were relatively few comments about humidity-related issues at home. Only a couple of specific cases were cited, which were noted to have a tangible impact on health.

Conversely, in the second focus group, two participants shared their experiences with occasional humidity problems, highlighting how these conditions can be uncomfortable. Additionally, one participant recounted an incident of flooding due to living in an attic. Although this flooding did not significantly interfere with her home or comfort, it underscored the potential vulnerabilities associated with high humidity and extreme weather conditions in urban living environments.

Additional costs arising from disability

Individuals with disabilities often face additional expenses for necessary services and products, which can place a significant strain on their family finances. These extra costs may include specialised medical equipment, assistive technologies, and personal care services that are tailored to their specific needs. Such items and services are frequently priced higher than standard alternatives, making it difficult for families to afford essential supplies.

This issue is known as the "poverty premium", referring to the extra costs that people with disabilities or those on low incomes incur for essential goods and services. This situation can be made worse by financial schemes offered by the public administration to support vulnerable individuals. Some participants noted that if they receive a disability supplement, they cannot access other grants that could help cover additional necessities due to the limitations of these financial programs. This is seen as a penalty, as the cost of living is higher for people with disabilities.

Moreover, many individuals with disabilities require larger or modified living spaces to accommodate mobility aids like wheelchairs or to create a barrier-free environment. This requirement can lead to increased housing costs, whether it is paying higher rent or making costly renovations to existing homes. As a result,

families may find themselves juggling multiple financial pressures, potentially impacting their overall quality of life and access to necessary resources.

Habits and consumption patterns related to various types of disabilities

Several participants reported a notably high consumption of essential supplies, particularly water and electricity, as they navigate daily activities for individuals with intellectual disabilities. Specific examples highlighted included prolonged showers taken for self-regulation, where individuals found comfort and relief; the habit of turning on every light in the house, often driven by anxiety about darkness; and sleeping with lights on to reduce fear, which can be common among those with sensory processing challenges. Additionally, the need for multiple loads of laundry each day was frequently discussed, particularly due to issues such as daytime or nighttime enuresis, which can create additional pressures on household resources.

On the other hand, some participants mentioned the underspending of energy while the children were not at home, to ensure they can heat home afterwards. Other aspect mentioned refers to the use of medical devices also played a significant role in the increased consumption of electricity. For instance, sleep machines, which help regulate patterns for individuals with sleep disorders, were noted as key contributors to the elevated energy use within these households.

Conversely, the critical importance of public aid and support systems was emphasised throughout the discussions. Participants stressed the need for comprehensive assistance, particularly for the wide range of disabilities that are often overlooked or less understood. Among the specific cases highlighted were disabilities encountered during childhood, the challenges faced by individuals who are electro-dependent and rely on electrical devices to maintain their health, and the unique needs of people who are deaf-blind. This diverse spectrum of experiences underscores the necessity for tailored support and resources to ensure the well-being of all individuals with disabilities.

Challenges in renewing equipment and enhancing efficiency

Difficulties have arisen in replacing appliances or components related to energy consumption, especially when these items are either damaged or need upgrading to more efficient models. Participants noted several challenges, including a significant lack of technical information that hinders decision-making processes. Additionally, the complexity of the installations often requires specialised knowledge or skills, making it daunting for average users to undertake such upgrades.

In a related discussion during the second focus group, concerns were raised regarding the apartments managed by the Àuria Group. This organisation has taken proactive steps towards sustainability by replacing traditional lighting with energy-efficient LED fixtures and installing solar panels on its buildings. However, it was pointed out that these solar panels are not yet operational in the individual apartments of the foundation's residents. This gap highlights a potential area for growth, as integrating renewable energy sources within the residences could significantly enhance energy savings and contribute to a more sustainable living environment for users.

Physical barriers that hinder comfort and accessibility

In various homes, specific physical barriers significantly hinder comfort and accessibility for residents. One notable issue is the inadequate ventilation in some houses, primarily due to the installation of safety grilles designed to protect disabled children. While these grilles serve an important purpose, they often obstruct the ability to open windows, thereby restricting fresh air circulation. Moreover, many homes lack suitable connection points for air conditioning units, making effective temperature control virtually impossible and leaving residents vulnerable to discomfort during extreme weather conditions.

In addition to issues related to ventilation and temperature regulation, accessibility challenges have been documented. For example, many homes do not provide sufficient space for wheelchair users to navigate freely. This lack of adequate space can have profound implications for mobility, independence, and the overall well-being of individuals with disabilities. An additional example involves a participant who attempts to hang clothes while using a wheelchair. This task is generally seen as efficient when performed outdoors, where factors like airflow and sunlight can aid in the drying process. However, when conducted indoors, the confined space makes it challenging to manoeuvre and reach appropriate hanging points. Moreover, hanging clothes inside raises humidity levels, which can create discomfort and affect the overall indoor air quality.

During the second focus group discussion with participants who have intellectual disabilities and receive support from the Áuria Group, a critical observation was made regarding the adaptability of their living environments. It was highlighted that while many homes remain poorly adapted to meet the needs of their residents, most families receive support from relatives, tutors, or the DPO to assist with daily tasks. This underscores the fact that most homes continue to function as standard residences, lacking necessary adaptations for enhanced efficiency or accessibility. Aside from a limited number of modified bathrooms, little has been done to improve living conditions for individuals with disabilities, leaving significant gaps in comfort and usability.

Relationship with the local community and mutual support

The relationship between homes for individuals with disabilities and their neighbouring communities is pivotal for fostering both accessibility and a sense of comfort. Often, the established rules governing community coexistence and the use of shared spaces can inadvertently limit residents' daily activities. For example, these regulations may impose restrictions on accessing areas that are essential for completing household tasks, such as kitchens or utility rooms. Moreover, they can complicate the installation of necessary appliances that enhance the quality of life, like air conditioning systems and solar panels, which are crucial for maintaining a comfortable living environment.

Two participants expressed their frustration by sharing personal experiences of being explicitly prohibited from installing solar panels, despite the environmental and economic benefits these installations could provide. This restriction not only affects their energy independence but also underscores a broader issue related to the lack of adaptive infrastructure that accommodates the unique needs of individuals with disabilities.

Conversely, there were also positive reflections on community solidarity among participants. Several shared heartwarming examples of neighbourly support were mentioned, including assistance with apartment maintenance and the proactive arrangement of key-sharing systems for emergencies. These acts of kindness not only strengthen interpersonal connections but also create a safety net that fosters a greater sense of belonging and security within the community. Overall, the dynamics of these relationships highlight the importance of inclusive policies that consider the needs of all residents while promoting a collaborative environment.

Complex procedures and insufficient administrative support

Accessing public aid can often be perceived as a daunting and time-consuming process. The administrative procedures involved are typically intricate, leading to resolution timelines that can stretch out over weeks or even months. This bureaucracy presents significant challenges for individuals with disabilities who rely on timely support. Additionally, city council staff frequently lack adequate training in disability-specific issues. This knowledge gap can lead to ineffective communication and poor coordination within departments, further exacerbating the delays and confusion applicants face.

Given these complexities, there is a pressing need for dedicated professionals who can offer personalised guidance and robust support throughout the public aid application process. These specialists could help navigate the various forms of assistance available, ensuring that applicants understand their options and how to access them effectively. Furthermore, enhancing the in-person engagement of city

council representatives at key sessions (such as focus groups and community outreach meetings) could foster a more inclusive environment and build trust with participants.

A significant concern is that many individuals are unaware of the full range of available aid, often focusing only on the electric social bonus. Furthermore, water is considered a basic need, but the additional costs associated with it are not always connected to energy poverty. In Catalonia, water supply is included under the definition of energy poverty in Law 24/2015. However, this is not the case for the rest of Spain.

It is crucial to highlight that various forms of support for individuals with disabilities are often determined solely based on the income of the household. This income-focused approach overlooks the unique and often substantial expenses incurred by individuals with disabilities, including costs associated with housing modifications, medication, specialised care, and adaptive transportation. These often-overlooked financial burdens can severely diminish disposable income, making it imperative to reassess how assistance is calculated and distributed.

Moreover, the dynamics between clients and service providers can vary dramatically, making it difficult for individuals to access the information and resources they need. The inconsistency can create barriers that hinder adequate support and complicate the navigation of available services. Lastly, it is essential to integrate cognitive accessibility measures alongside physical and sensory accessibility. This means developing environments, activities, services, and assistive devices that promote clear communication and understanding, ensuring that all individuals, regardless of their abilities, can access the aid they deserve.

4.Conclusions

The two focus groups conducted with people with disabilities reveal an intense and complex relationship between energy poverty and social vulnerability. The findings highlight a series of interconnected challenges related to housing conditions and comfort, economic pressures, and the availability of institutional and social support systems.

One key issue that emerged concerns **housing conditions and thermal comfort**. Participants consistently identified summer heat as one of the most pressing challenges they face. Many described it as nearly impossible to maintain comfortable indoor temperatures during heatwaves. This issue has a direct and significant impact on health and well-being, particularly for individuals with mobility limitations or chronic conditions.

While many participants rely on ceiling fans as a more affordable and comfortable alternative to air conditioning, fans are largely ineffective during extreme heat. Additionally, several participants encounter technological and physical barriers, such as poorly positioned air-conditioning units in their homes or a lack of proper electrical connections to install or use them effectively. Safety-related constraints, such as fixed security grilles that prevent ventilation, further limit the ability to regulate indoor air and temperature. Overall, these factors result in unequal exposure to heat stress, highlighting how inadequate housing conditions and limited access to effective cooling solutions can increase the vulnerability of people with disabilities.

Another important aspect is **the economic pressures and the gaps in financial support**. Energy poverty among participants is exacerbated by the high, often unacknowledged, costs associated with living with a disability. These costs include expenses for specialised medical devices, assistive technologies, personal care services, and the need for larger or adapted homes. Such additional expenses place families under significant financial strain.

Public financial support programs rarely acknowledge these realities. Aid eligibility is typically based solely on household income, neglecting disability-related expenses that considerably reduce available resources. Participants also reported facing bureaucratic obstacles in accessing support, including lengthy procedures, unclear information, and a limited understanding of disability-specific needs among municipal staff. These administrative inefficiencies not only delay assistance but also foster feelings of exclusion and frustration among those seeking help.

Finally, participants considered that **accessibility and inclusion must be reframed when developing public policies**. The discussions emphasise that accessibility should be understood in a broad sense, extending beyond just physical access. It should also encompass cognitive, sensory, and communicative dimensions. Many participants shared their challenges in understanding official information and procedures, highlighting the need for easy-to-read communication formats and personalised guidance throughout administrative processes.

Equally important is the creation of inclusive community environments. While some participants reported positive experiences with neighbourly support, others faced restrictive housing or community regulations that limited their autonomy, such as prohibitions on installing solar panels or air-conditioning units. These circumstances underscore the need for local-level interventions that promote collaboration and shared responsibility for accessibility and energy efficiency.

As **key lessons and recommendations**, the experiences of participants lead to several cross-cutting lessons:

- Adopt a holistic approach to accessibility that integrates physical, cognitive, and social dimensions.
- Acknowledge and quantify the real extra costs of living with a disability when designing financial aid and energy poverty mitigation programmes.
- Simplify administrative processes and create specialised support roles to guide individuals through available assistance.
- Promote inclusive housing policies that prioritise thermal comfort, energy efficiency, and adaptive design.
- Encourage community-based support and awareness among neighbours and local authorities to reduce isolation and strengthen resilience.

5.Inputs for Training Materials

To enhance training materials, Ecoserveis recommend the following **guidelines**:

1. **Understanding home energy use and comfort**
   - Explain the relationship between energy use, comfort, and health.
   - Provide accessible guidance on managing indoor temperatures, with emphasis on summer heat mitigation.
   - Include low-cost, practical strategies (e.g., use of blinds, ventilation, fan placement, and energy-efficient behaviours).

2. **Efficient and safe use of appliances**
   - Offer simple explanations of how to use and maintain fans, air conditioners, and heaters efficiently and safely.
   - Provide visual examples of correct equipment placement and how to avoid energy waste (e.g., keeping windows closed while cooling).
   - Address accessibility and safety considerations (reachable switches, safe cable management, and maintenance routines).

3. **Economic management and energy rights**
   - Include information on household budgeting and understanding utility bills.
   - Explain existing energy-related social benefits and how to apply for them, step by step.
   - Highlight common barriers in administrative processes and offer contact points for assistance (social workers, DPOs, municipal services, etc.).

4. **Health, well-being, and energy**
   - Present the connection between inadequate indoor temperature and health risks.
   - Promote behavioural adaptations for heatwaves (hydration, timing of activities, use of public cooling spaces).

- Include advice for people who are electro-dependent on emergency preparedness.

5. **Accessibility and inclusion**
   - Emphasise the importance of accessible housing and the value of collaborative efforts within the community.
   - Provide examples of how individuals can engage in discussions with neighbours and housing managers about necessary adaptations, such as air conditioning, solar panels, and safety grids.
   - Raise awareness about inclusive design and explain how to seek support for home modifications.

As examples of **training materials**, the following references could be considered:

1. Provide guidance on the effective use of air-cooling solutions, including practical strategies.
2. Offer clarifications on adaptations for maintaining thermal comfort at home, as well as tips for appliance maintenance and managing energy consumption.
3. Share advice on how to protect oneself from heatwaves, including practical recommendations.
4. Create an easy-to-read guide for applying for bonuses and grants, complete with a glossary of basic energy terms.

Annex A - Thematic analysis

Theme	Description	Examples
Summer heat as the primary comfort issue	In general, the related comfort problems in the home are more concentrated in summer than in winter. Keeping the home cool during the summer is one of the main challenges (some participants state that rooms reach 40 °C during heatwaves). In this sense, some people prefer to use ceiling fans instead of air conditioning, as they find them more comfortable or economical. However, during heatwaves, these fans are often not enough to maintain an adequate temperature. It has also been detected that many people are unsure if it is possible to install fans on the ceiling of their home and need guidance or technical support to evaluate this option.	*The family is fine in the winter, but not in the summer. They suffer from heat stress problems at home, which are more pronounced in the summer.* *This summer, it was 40 degrees in her housemate's room. She does not feel comfortable in the summer.* *Her family installed ceiling fans, and they helped a lot. She is not a fan of air conditioning.* *In heatwaves, she thinks the fans aren't enough.* *There is a fear of installing a ceiling fan in case it falls (false ceiling). She needs to evaluate it carefully because she is afraid the ceiling might not hold up.*
Challenges associated with the installation and utilisation of air conditioning systems	The installation of air conditioning can create challenges for accessibility and comfort for people with disabilities. Often, the air conditioning units are placed in locations that do not align with the areas where cooling is most needed. As a result, the system must be operated for more	*The family installed an air conditioning system in the dining room, but it does not reach their daughter's room, where it is needed the most. As a result, they turn on the air conditioning at higher temperatures to try to cool her room. Consequently, the electricity bill*

	extended periods to distribute air to other spaces, which can disrupt comfort and lead to increased energy consumption. In the case of centralised air conditioning systems, regulating the temperature in individual rooms can be problematic. This situation can lead to high energy usage and should only be used in extreme circumstances. It may prompt some individuals to rely on alternative solutions like radiators or fans, which can further compromise home comfort. Another factor contributing to energy inefficiency is the habit of leaving windows open while air conditioning systems are running, leading to higher electricity consumption.	*skyrockets during the summer. During heatwaves, all three family members have been sleeping in the dining room to stay cool.* *Everything in the house is electric and centralised. When they turn on the air, it reaches all the rooms, and consumption is much higher. They have to put radiators to spend less and also fans. That is how they solved it. But logistically, it is not easy.* *She does not turn on the centralised cooling pump because of the high energy consumption.*
The impact of indoor environments on health	Some impacts on health and personal well-being were identified, primarily due to high temperatures in summer. Among the effects described are irritability, general malaise and the aggravation of symptoms related to physiological processes such as menopause. These conditions can affect mood, rest and quality of life, especially during prolonged periods of intense heat.	*During extremely hot weather, her daughters, who have intellectual disability, tend to become quite irritable.* *She reports problems associated with heat, mainly due to menopause, which causes her to have dry eyes and throat.* *She reports that the rot on the exterior facade of the building caused migraines, nausea and vomiting.*

	In the first focus group, Barcelona is generally considered to have worse humidity compared to other areas further inland. However, there were not many comments about humidity problems at home, only a few specific cases that affected health. In the second focus group, two participants mentioned occasional humidity issues. At the same time, another person shared an experience of flooding from living in an attic, although it did not affect her home or comfort.	*She reports problems with humidity in her son's room.*
Additional costs arising from disability	People with disabilities often incur additional costs for services and products, which can strain their family budget and affect their ability to purchase necessary supplies. Specialised products or services designed to meet their needs can be expensive, and the requirement for larger homes may further increase overall expenses.	*She has a child with intellectual disability and many expenses with school, psychologist, therapy, etc.* *The grant for the child to attend summer camps for people with disabilities is only for 4 weeks of vacation, and the family's income levels must be very low. On the other hand, families with disabled children pay up to 3 and 4 times more for summer camps for people with disabilities.* *They moved house in January because they needed more space for their disabled children. It is a big house, so they spend*

		more, not only on consumption but also on taxes. Even water taxes have gone up. *Because of her disability, she needs socks for his stumps that are much more expensive, even if they are still made of cotton and have nothing special.*
Habits and consumption patterns related to various types of disabilities	Some participants reported high consumption of supplies, primarily water and energy, in order to manage daily activities for individuals with intellectual disabilities. Examples included taking long showers for self-regulation, turning on all the lights in the house, sleeping with the lights on out of fear of the dark, and doing multiple loads of laundry each day due to issues like daytime or nighttime enuresis. Additionally, the use of a medical device, such as a sleep machine, was noted as contributing to increased electricity usage. On the other hand, the significance of public aid and support was emphasised, especially considering the diverse range of disabilities that exist beyond those most commonly recognised. Specific cases mentioned included childhood disabilities, individuals who are electro-dependent	*Her son has an intellectual disability and needs water to regulate himself. Due to his degree of disability, he does not receive aid, but he uses a lot of water because her son can be under the shower fora long time.* *Her son turns on all the lights because he is afraid of the dark. She also mentions that there are lights on all day or all night.* *Many families with children who have cognitive and intellectual disabilities often do one or two loads of laundry each day. This is because these children may get dirtier due to a lack of dexterity and body awareness, as well as issues with sphincter control.* *Electro-dependent individuals were the group most affected during the blackout in Spain in April 2025. It is essential to develop a protocol for assisting these*

	and rely on electrical devices for health, and people who are deaf-blind.	*individuals during emergency situations. This protocol should not only address the needs of electro-dependent people but also consider all dependent individuals, such as a child who cannot use stairs without an elevator or a person with limited mobility.*
Challenges in renewing equipment and enhancing efficiency	Difficulties have arisen when replacing appliances or components related to energy consumption, whether they are damaged or need upgrading to more efficient models. Some of the challenges include a lack of technical information and the complexity of the installations. Another point raised in the second focus group concerns the apartments managed by the Àuria Group. This foundation has reported that it has started replacing lighting with LED fixtures and has installed solar panels in its buildings; however, these panels are not present in the apartments of its users.	*Her family has not installed LED lights in their house yet, but they want to see what it is like when they make the switch, as they think it will not be easy.* *A gas radiator in the dining room broke down. She has not replaced it yet, and they are using another radiator that doesn't reach the dining room.*
Physical barriers that hinder comfort and accessibility	Specific physical barriers have been identified that hinder comfort in the home. For instance, in some houses, proper ventilation is not feasible because a grille installed for the safety of a disabled child	*She cannot ventilate her house in the summer because they have windows with special closures for their intellectually disabled son.*

	often prevents the windows from opening. Additionally, air conditioning may be unusable due to the absence of a suitable connection point, limiting effective temperature control. Accessibility issues have also been noted, such as insufficient space for wheelchair manoeuvrability, which impacts mobility and overall well-being. A specific point raised in the first focus group involving participants with intellectual disabilities who receive support from Áuria Group (DPO) is that while some homes are not adapted, most families receive assistance from relatives, guardians, or the DPO to handle daily tasks. Therefore, it is evident that most homes remain "normal," lacking adaptations for efficiency or accessibility beyond a few modified toilets.	*She has an air conditioner that she cannot use because a connection needs to be made.* *Although she has an adapted apartment, she has to turn her wheelchair because the doors do not fit it.* *She lives with a roommate who has reduced mobility and uses a device (like a platform) that consumes a lot of electricity if used frequently.*
Relationship with the local community and mutual support	The relationship between homes for individuals with disabilities and their neighbouring community is crucial for ensuring both accessibility and comfort. Often, the rules governing coexistence and the use of common spaces can limit daily activities. For instance, these rules may restrict access to areas suitable for	*Due to her physical disability, she cannot hang her clothes on the balcony of her house; she has to do it through the window of the interior courtyard. The neighbours put up some clotheslines to help her hang her clothes.*

	household tasks and complicate the installation of necessary appliances, such as air conditioning or solar panels. In fact, two participants noted that they had been prevented from installing solar panels. Additionally, some participants shared examples of community solidarity, such as help with apartment maintenance and the arrangement of key-sharing for emergencies.	*At home, she had an air conditioner on the balcony of her apartment that faces the street. Still, due to urban planning regulations, it can no longer be in sight. An alternative would be to put it on the roof of the building. However, the neighbourhood association has not permitted it. She believes that support from public administration is essential in such cases.* *She mentions that the neighbours on the building's roof declined to install solar panels.*
Complex procedures and insufficient administrative support	Accessing public aid is often seen as complicated and slow. The procedures are complex, and resolution timelines can be lengthy, which makes it challenging for people with disabilities to receive support on time. Furthermore, city council staff often lack specific training on disability issues and struggle with internal coordination, leading to confusion and delays. Due to these challenges, there is a clear need for a professional who can provide close and comprehensive support throughout the process. Additionally, greater in-person involvement from the	*She finds it challenging to obtain information about various types of aid and to comprehend them. She also expresses that the public administration's social services lack adequate knowledge regarding disability.* *She believes that aid should be centralised among technical experts. Many social workers often focus on procedures that involve only a single aspect.* *She states that she has spent three months doing procedures for her daughter since she turned 18.*

	city council during sessions, such as focus groups, is essential. Many participants are also unaware of the full range of available aid, mainly focusing on the social bonus. It is concerning that many forms of assistance for individuals with disabilities are calculated solely based on the income of the household. This approach fails to consider the specific expenses associated with disability, such as housing adaptations, medication, care, and special transportation, all of which can be substantial and significantly reduce disposable income. Moreover, the relationship between clients and suppliers can vary widely, and finding information is not always easy. Finally, it is important to consider cognitive accessibility measures alongside physical and sensory accessibility. This includes creating environments, activities, services, and devices that facilitate easy understanding and communication.	*She explains that social services often provide only a list of entities, requiring users to independently navigate the procedures for accessing aid.* *Families of individuals with disabilities spend a significant amount of time managing bureaucracy and completing necessary procedures. Additionally, there is a noticeable lack of support from public administration for these families.* *Since her household has two incomes, her family does not qualify for specific scholarships available for their disabled daughter. The issue is that the financial aid is determined by their salaries without considering their expenses.* *She believes that explanations regarding aid and administrative procedures should be translated into easy-to-read formats.*

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PROJECT FACTS

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