HEATING AND COOLING
KNOWHOW AND SOLUTIONS

D6.3 – HACKS value-added report - Lessons learnt from interviews with multipliers

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European portal www.topten.eu/hacks
Project partners and websites

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About HACKS

The objective of the Heating and Cooling Knowhow and Solutions (HACKS) project is to achieve market transformation for heating and cooling (HAC) appliances and improve comfort and health of European citizens.
Across the EU almost half of all buildings have individual boilers that were installed before 1992 with efficiency of 60% or less. The expected energy savings from a speedy replacement are immense.
To achieve this goal, 17 HACKS partners in 15 countries worked together, thanks to the financial support of the European Horizon 2020 programme.
After scanning market actors, current policies and most commonly used products in each country, starting from April 2020 the HACKS partners have implemented involvement campaigns to raise awareness of the economic and environmental benefits brought by good HAC products and solutions:

1. HACKS has motivated households equipped with old and inefficient devices – boilers, water heaters, air conditioners, certain types of boilers and stoves, etc. – to replace them with new super-efficient equipment.
2. In each country, partners have set-up dedicated on-line platforms to assist consumers in their purchasing process. The platforms propose: tools to assess households' needs and provide customised information; best product lists with technical specifications; direct links to suppliers of most efficient products; and advice on how to use and maintain equipment.
3. For those households who need to improve their situation because they feel too hot, too cold, or too humid but who cannot invest in new equipment or can avoid getting equipped, HACKS proposed simple and low costs solutions. It is possible to reduce energy consumption and energy bills while improving winter and summer comfort, air quality and health conditions through the installation of shading devices, thermostats, water saving taps and showerheads, etc.

Beyond households, HACKS has targeted all relevant stakeholders (“multipliers”) that participate in the decision-making process of consumers by setting up strategic partnerships to facilitate the purchase of energy efficient appliances. HACKS placed a strong emphasis on installers but also retailers and consumer organisations because of their proximity to consumers, their capacity to involve them and bring them guidance on energy efficient equipment.
More information on the HACKS project can be found at www.topten.eu/hacks. Most national HACKS website will remain active after the end of the project.

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1 Introduction

Aside from quantitative environmental and economic impacts (calculated in D6.2), the Topten activities undertaken within the HACKS project have impacts on the market. These impacts are definitely real but difficult to measure. For example, policy makers favouring ambitious regulations; a city modifying its procurement policy; a utility deciding on a rebate programme; NGOs communicating on energy savings in homes in order to link individual behaviour and climate change issues; installers and retailers choosing to adopt energy-efficient positioning and revising their product range; manufacturers developing new efficient models and strongly marketing them; consumers demand for efficient models growing. Though these decisions depend on the strategies stakeholders decide to adopt, HACKS has weighed, more or less explicitly, in all of them.

Topten – as a tool in the market transformation toolbox – involves several target groups and key actors to whom it brings different inputs that help them reach their goals and in turn reinforce the project. Different actions with different stakeholders of the HACKS project are meant to reinforce one another, transforming the market towards highly energy efficient products and raising awareness about low- and no-cost heating and cooling solutions.

The HACKS objectives were, between September 2019 and February 2023:

- To raise awareness and inform consumers on HAC (Heating And Cooling) economic and environmental stakes, technologies and solutions.
- To engage consumers and assist them in their choice and in the purchasing process of new HAC equipment.
- To reinforce consumer action via the involvement of all relevant stakeholders participating in the product choice of consumers.

Consumers are overwhelmed by different types of information, often very technical on products, while at the same time not always aware of the financial and environmental stakes related to HAC equipment and their multiple benefits. Individual consumers were the intended target of the HACKS project because when a critical mass is reached, they have the power to shift the market. However, because of the structure of the HAC markets, consumers were reached, beyond the Topten website and competitions, through an integrated approach involving all relevant stakeholders to achieve market transformation and fight against the market's inertia.

Installers are the main prescribers of large heating and cooling equipment, though they are often linked to certain brands. Topten/ HACKS information and actions incited them to promote energy-efficient products while advising consumers. As stated in the EU Heating and Cooling strategy, “installers are the market makers for many technologies” and their involvement is key for the energy transition.

Manufacturers and retailers define the technical attributes of products and the product range available to consumers. Topten helped them build trust in the demand for top efficient products so that they could engage in market transformation. Manufacturers and retailers were reached through direct contacts (manufacturers) and cooperation projects and affiliate marketing activities (retailers).

Policy makers can use the Topten information to design policy tools to transform the market towards more efficient products and to launch supporting programmes.

"**Multiplier**" organisations using and relaying the Topten message in their daily activities to their own target groups: **NGOs**, mainly environmental and consumer organisations, **local governments and institutions** who can use Topten for their own procurement activities and to convey a message to their population, innovative manufacturers and large retailers promoting Topten.

In summary, HACKS intended to bring to all of these target groups and key actors an added value, according to what they are looking for:

- Consumers get a wide range of contextual information for HAC products and low- and no-cost measures to reduce energy bills. They also get precise and detailed product information, tailored to their national markets.
- Installers get support to help and convince consumers to invest in best performing products
- Manufacturers get support for marketing their models on Topten websites listed products
- Retailers benefit from the sales of Topten products, as they increase their mark-up and reinforce their image
- Professional buyers, public authorities and procurement officers get support for their specifications, can reduce their operating costs and ensure the best use of public funds,
- Policy makers benefit from real time market data on the most efficient products and can take informed decisions on policy tools
- Utilities can continuously identify the best products and can use HACKS as a basis for their rebate programmes and for informing their clients and
- NGOs and consumer organisations can use the information provided by Topten in their own campaigns on sustainable consumption, climate change, fuel poverty or air quality.

To verify in how far these objectives were achieved, short interviews were conducted towards the end of the HACKS project with different types of stakeholders at the national level. Even if, as for all interview exercise, the HACKS teams had to face a certain turnover at several stakeholders', a total of 64 interviews could be achieved.

Section 2 presents the feed-back received from different stakeholders, section 3 some conclusions drawn by the HACKS project, and section 4 the questionnaire used and the list of interviewed stakeholders.

2 Topten added value for different stakeholders

In order to collect feedback from the various stakeholders' groups, questionnaires were developed (presented in Section 4); the questions are generally similar with some adaptations for each target group. Altogether 64 interviews were undertaken by project partners (see Table 1). A list of all interviewed stakeholders can also be found in Section 4.

In the next pages, a summary of the feedback received is presented, per stakeholder group. The objective was not to describe their actual interactions with the HACKS project (this is done in other Deliverables) but rather to reflect on the usefulness of this interaction to the stakeholders, to collect their opinion on how the Topten-added-value could be improved from their point of view, and their perspectives and wishes for the future.

One should note that, though the feedback was aggregated and summarised, each feedback received on Topten and on the HACKS project is actually very specific to the person that answered the questions (e.g. was it a person from a marketing department or from an R&D department within the same organisation) and to the country where this person knows Topten (at the national level, the Topten websites present different features and have undertaken different partnerships). Hence Section 2 presents "untreated" feedback, whereas a Topten point of view on the feedback is presented in Section 3.

Type of stakeholder	Number of interviews	From country
Consumers	19	AT (2), CH, CZ, DE, ES (2) FR, IT, LT, LU, PL (3), SE (2), UK (3)
Installers	7	CH, FR, DE, CZ, LU, ES, IT
Retailers	5	AT, BE, DE, IT, LT
Manufacturers	5	BE (2), LT, UK (2)
Public Authorities and policy stakeholders	12	BE (2), CH, FR, DE, PT, CZ, LT, LU, PL, SE (2)
Utilities	4	CH (2), CZ, IT
NGOs	12	FR (2), DE, CZ, ES (2), IT, LT, LU (2), PL, SE
Total	**64**	

Table 1 - Overview of the interviewees by type of stakeholders

2.1 Feedback from consumers

The 19 consumers were interviewed taking advantage of a meeting at a fair, a conference, of their participation in a HACKS competition / raffle, recruited thanks to social media or via acquaintanceships.

Consumer analysed the last 3 years context as a turning point: The recent energy crisis and rising energy costs have made individuals more conscious about their energy consumption and more likely to seek information on energy-efficient products. The pandemic did not have a significant impact on energy savings, but the geopolitical and energy crises have led to a shift in attitude towards renewable energy systems such as PV panels and heating system using renewable energy sources. Topten is seen as a valuable tool for consumers to find information and make informed choices in the overwhelming market of consumer products. There is a need for greater awareness and dissemination of Topten to help people navigate through the available options. Knowledge and behavioral changes are considered crucial for achieving energy efficiency, alongside focusing on energy sources and products.

The interviewed consumers are interested in energy savings and cited as **most important criteria to choose a new appliance** its quality, its performance, its energy costs and its durability – and to a lesser extent its price and aesthetics. They state that, for consumers "in general", financial savings are generally considered a crucial factor in product selection, followed by quality, while the environmental aspect may not hold as much significance. Energy labels are primarily viewed as a means to save money rather than as an environmental consideration. However, the presence of energy-saving numbers on products and the ability to see the environmental impact on the Topten websites differentiate them from other lists or price-based sorting options on retail websites

Consumers appreciate several aspects of Topten and consider Topten a reliable source for finding information on new products. They particularly value the product lists and the selection criteria, which help them find environmentally friendly and energy-efficient products. They trust Topten's selection criteria and rely on the information provided by the organisation. They find the HACKS recommendations and advice useful. Additionally, consumers have recommended Topten to others, based on their positive experiences and have made purchasing decisions based on the listed products and criteria. They also appreciate information on funding schemes.

Some consumers emphasized that they would prefer having direct contacts (as opposed to only on-line information) especially regarding complex topics such as HAC, and also a stronger support to be more pro-active (e.g. more information about the raffles' prizes, or how to use the calculator).

Consumers emphasize the importance of considering benefits beyond energy efficiency when evaluating products. While transparency about the HACKS methodology and selection criteria is appreciated, some consumers express less interest in reading through the criteria and prefer to rely on the fact that appliances have been checked and meet the criteria set by Topten (and the organisation managing the project which is a guarantee).

Consumers stress the importance of connecting environmental benefits with other factors. This combination of environmental and economic considerations is becoming increasingly important as more people prioritize environmental concerns.

Overall, consumers appreciate the clarity and helpfulness of Topten's information but offer suggestions to enhance usability, expand product offerings, and provide additional guidance to cater to a wider range of consumer needs.

Suggestions from consumers for improving the Topten project and its HACKS sections include:

- Improving navigation and providing more explanations, particularly on the front page and product pages. Definitions of technical terms should be displayed directly on the product lists for easier understanding.
- Updating the website design, as it currently appears dated.
- Providing guides on calculating energy costs based on individual tariffs.
- Expanding the range of listed products.
- Offering basic guidance on selecting suitable heating system sizes for different house sizes.
- Including information on the expected lifespan of biomass boilers.
- Incorporating a series of questions on the homepage to help users determine which heating system is appropriate for their homes.
- Enhancing the environmental focus by providing information on the production, recyclability, and materials used in products.
- Including more products and categories suitable for renters or apartment dwellers.
- Keeping up with changes in consumer needs and highlight important products over time.
- Considering collaborating with recommended installers and providing links for consumers seeking installation services.

2.2 Feedback from installers

Interviewees for this stakeholder group come from very different organisations: a one-person company specialising in renewable energy, a large association of installers, and a service provider as part of a professional association. Their objectives are to find good solutions for their customer, install good products, make benefits and limit after-sales services.

In terms of context, during the pandemic, installers' revenue has raised (one installer experienced a doubling of total revenue between 2020 and 2022). The pandemic heightened the desire for individuals to generate their own heat independently, leading to a growing demand for efficient heat pumps. However, the financial risks resulting from the pandemic limited some families' ability to invest in heat pumps, given that they are significant long-term investments.

The energy crisis has had an impact on prices, which have been increasing every six months. Delivery issues, particularly with customer-specific orders, have also been noted. However, for very standard goods (such as ACs), the installer's delivery plants in Europe are assessed as capable of producing and delivering a wide range of catalogue devices quickly. Consequently, due to the energy crisis and the significant rise in heating costs for conventional systems, there has been a substantial increase in demand for efficient heating solutions. Heat pumps, in particular, are highly sought after, as people aspire to achieve energy independence and mitigate concerns over potential future energy shortages. In France, the increase of activities is mainly due to changes in governmental financial support, including the introduction of a subsidy programme.

For interviewed installers **the main criteria for choosing products** are quality, sustainability, and performance, whereas price tends to be considered to a lesser extent. Prices can be more easily than before balanced with costs and with new topics such as durability and especially spare parts availability.

In terms of cooperation with HACKS, installers regularly provided product data for new models, allowing interested parties to easily access further information through direct links. In Switzerland, the most active ones supported Topten in a project investigating the suitability of air conditioning units for heating, offering technical expertise and facilitating access to practical case studies. Installers were also invited to participate as speakers in HACKS information session, e.g. focusing on heat pumps. Some of them are partners with the local Topten project, fostering a cooperative relationship based on mutual exchange of technical information.

Topten, in turn, assisted in showcasing efficient products through the release of product lists. Additionally, Topten explored the feasibility or underlined the existence of public rebate programmes, acting as incentives for purchasing best products and alternatives to direct electric heaters, or fossil-fuelled equipment. The HACKS websites content was used as a resource for the installer's customers, providing them with neutral and independent information

Installers appreciate that reputable brands are well-acknowledged on Topten and the content of the advice provided (the interviewees did not make extended use of the HACKS calculators, because they are used to other tools). While the product lists are assessed as good, one installer pointed out that efficiency is highly dependent on proper system installation, making comparisons challenging (though the same argument would be true for the European energy label). In addition, the product's reliability could be an issue as it is difficult to rate (some products, even from very well-known brands have good performances but questionable reliability).

Suggestions from installers for improving the Topten project and its HACKS sections include:

- Adding a column in the product lists to highlight the refrigerant used, as climate-friendly refrigerants are becoming increasingly important.
- Adding direct links to installers website and web-shop for easy access.
- More professional guidelines
- A newsletter to keep industry professionals informed of legal changes and sector innovations.
- Developing material explaining technical issues that installers could give to their customers.

2.3 Feedback from retailers

The interviewed retailers are of different types (wholesalers, large and small retailers, comparison website) but all have an **interest in energy efficient products** for their own range and own environmental policy.

Retailers collaborate with Topten/HACKS mostly by exchanging information on sustainability and energy efficiency, on exchanging product data and preparing, when possible depending on products, referral marketing links.
One retailer in Germany also supported a HACKS social media campaign promoting energy-efficient products, and in Lithuania the local HACKS calculator allowing to assess the financial feasibility of installing a heat pump in an average multifamily house was also discussed.

In the last three years, during the pandemic, a shift in the behavior of installers towards online business was observed. As a response, specific information targeting professional customers were developed on retailer's websites. Gas boilers demand has significantly decreased due to the rising prices and increased promotion of heat pumps in the media and because people are focused on long-term energy savings. The challenge lies in the limited availability of heat pumps compared to the growing demand: it is frustrating to constantly inform professional customers that it is not possible to deliver the requested items within their expected timeframe.

Another issue relates to governmental subsidies because if equipment is not delivered on time, households may be unable to claim their subsidies. Governments should address this matter to capitalize on the willingness of people to invest in energy-efficient solutions. Price often takes precedence over environmental considerations, but having both benefits would be a win-win situation.

Retailers perceive that industry seems to be strongly evolving, including around the conversion of gas boilers into hydrogen boilers.

For retailers, **the most important criterion for choosing a product for their range** is the margin, preferring to work with good-quality products that require minimal after-sales service. However, they underline that high demand in the market allows manufacturers to charge higher prices, reducing the margin for retailers and installers. Today, the focus is on offering products that increase energy efficiency, and manufacturers provide training to keep installers updated on the latest product developments. Recommendations are made towards the most energy-efficient models due to the growing market demand for those appliances. Both spontaneous customer demands and active prospecting contribute to promoting these appliances. Hence, price is currently *not* a deciding factor for customers, but it may become one in the future. Affordability will play a crucial role, and if customers cannot afford the products, it will affect both the end customer and the installer.

Retailers appreciate Topten advice pages because they address consumers' concerns and help overcome threshold fears. Many people mistakenly believe that heat pumps are not suitable for older homes, highlighting the need for better information dissemination among both consumers and installers. It is a very positive point that HACKS present both financial saving and environmental impacts.

While the calculator is viewed as a useful tool, there are suggestions for improvement, such as providing explanations on why a particular option is the best for a specific home and recommending consumers to consult their local installers for price quotes.

Suggestions from retailers for improving the Topten project and its HACKS sections include:

- Topten brand awareness and marketing efforts to promote the website and reach a wider audience
- Promoting the tool to installers for their use and to recommend to customers, enabling consumers to understand the benefits and differences between heat pumps and promoting energy efficiency.
- Improving the intersection between the product list and the price comparison websites.
- Integrating the HACKS calculator in price comparison website (after adaptation).
- Using the Topten network in Europe to provide consulting tools and tips to retailers' websites within a same retail group.

2.4 Feedback from manufacturers and manufacturing groups

The interviewed manufacturers mostly came from large associations, one large company and a small one, and a chamber of commerce. They **support energy efficient products in general** and some are committed to support sustainable development in their daily business.

Manufacturers collaborate with Topten/HACKS mostly by providing product data. This type of collaboration is the choice of individual manufacturers – generally at the forefront of the market - rather than of their associations that have to represent all of their members. Manufacturers are also involved, directly or through their associations, in blog articles / HACKS promotion for the public or for their members. In some countries, collaborations between manufacturers and Topten are technical, e.g. with discussions on technical improvements for solar batteries, exploring potential solutions to increase efficiency by 60-70%. These collaborations continue, aiming to develop and test prototypes while having existing models of PV panels listed in the HACKS database.

Some manufacturers find this collaboration challenging because it requires extra work to convey the data, but also to provide feed-back. Topten's goals and the clarity of its content are sometimes questioned, as manufacturers perceive it to be difficult for consumers to understand.

It seems that for manufacturers, though creating uncertainties, **the context of the last 3 years** is evaluated as rather positive: companies are primarily focused on the economic crisis, staff costs, and legislation. The impact of the pandemic has been relatively minimal for many, and the period has been beneficial for the heating industry, as people being at home have shown a willingness to improve their heating systems. Despite inflation and expensive material prices, the energy crisis has actually motivated consumers to invest in renewable energy, resulting in positive outcomes for most businesses. While there is a rise in labour costs, companies are managing to find ample employment. An increased interest from the media and the general public regarding energy-saving and cost-efficient practices has been observed. While individuals with higher incomes have already embarked on the energy transition, the real challenge lies in engaging those experiencing "energy poverty." The struggle lies not only in providing awareness and information on energy-saving techniques for vulnerable households but also in their limited financial capacity to invest in renewable energy. The Green Deal aims to support these households to some extent, but activating them will be a significant challenge.

For activities for which the pandemic initially caused a freeze, now there is higher attention and government support for HPs and PV panels due to their contribution in expanding green energy and transitioning towards a more decentralized energy system. This shift is important, particularly considering the vulnerabilities in highly centralized energy systems exposed by the war in Ukraine. In terms of market, it is growing rapidly for heat pumps, and companies are already projecting themselves in 20 years from now, selling replacement products to existing users.

Interviewed manufacturers place utmost importance on the **performance, quality, and then cost of their products**. Performance serves as a key factor in their brand positioning, while ensuring high-quality products is crucial to establish a positive customer experience during their initial heat pump installation, as a negative experience could hinder market growth. Although cost is a consideration, heat pumps are profitable in the long run, especially with subsidies available, and therefore manufacturers continue investing in quality items. Featuring in the Topten list is therefore important (one manufacturer underlined it was not a priority but they had to maintain a presence on the website to avoid losing out to competitors). The energy crisis has sparked increased interest in energy-saving measures, and retailers leverage this

momentum by emphasizing the most energy-efficient products available. Manufacturers appreciate independent platforms like Topten for providing a diverse range of information, including valuable independent advice.

Manufacturers appreciate Topten for several reasons, especially for its user-friendly advice pages that provide valuable information not only about the financial benefits of energy-saving products but also highlight their environmental advantages. It is important to influence behaviour change, not solely based on monetary savings but also for environmental reasons. By using consistent messaging across the platform, Topten helps to create lasting behaviour changes in consumers.

Manufacturers also value the product lists provided by Topten, which showcase the most efficient and environmentally friendly products available in the market and the guidelines for professional. One association mentioned to find all the tools offered by HACKS beneficial and to actively promote them to their members.

Suggestions from manufacturers for improving the Topten project and its HACKS sections include:

- More awareness raising on the importance of renovating buildings and finding sustainable energy sources as crucial considerations, as relying solely on electricity is insufficient to reduce the use of gas and fuel oil.
- Lobbying activities for collective solutions, such as deep geothermal energy.
- On the HACKS content:
    - Updating the criteria for air conditioners on Topten to include the heating function
    - Incorporating circularity for materials
    - Expanding the product lists on Topten to include more green energy items like PV panels and solar collectors, as a growing trend in this area is anticipated
- On the HACKS tools and activities:
    - Automated data retrieval, possibly through the Eurovent platform or using the EPREL database.
    - Investing in SEO to increase Topten visibility.
    - Developing a tool that could compare services offered by different brands (the current HACKS calculator cannot compete with manufacturers' calculator that have one for each brand)
    - Creating professional guidelines for retailers and their staff members (guidelines that could be shared on manufacturers' website and social media channels)
    - Organise joint webinars on relevant subjects, intending to offer these webinars more frequently to their members.

Overall, interviewed manufacturers highly appreciate Topten as a great initiative and recommend its continuation and regular product updates.

2.5 Feedback from public authorities and policy stakeholders

Public authorities are active in the field of energy efficiency and **support energy efficient products in general** with manifold activities on different political levels. The interviewed stakeholders in this category cover federal and governmental agencies, cities and energy efficiency advisers working for cities.

While the pandemic tended to freeze all other issues than health issues for official, governmental messages, the **current energy crisis requests responses**: policy stakeholders are confronted with more parliamentary requests and new tasks to develop adapted regulations; they are asked to support the population by providing subsidies and energy-saving tips; they receive more requests for energy consultation from the public, particularly for photovoltaic systems and renewable energy-based heating installations. This also had a significant impact on Topten, increasing its visibility (in some countries, it is now seen more as a consequence of measures taken to address the energy crisis rather than a tool to influence those measures directly).

This category of **stakeholders uses Topten/HACKS in various ways** to support their work. They provided examples: They promoted HACKS content to private consumers, companies, and colleagues to identify recommended products and gain insights into the best options available on the market. The fact that Topten offers detailed information on energy-efficient products is often complementary with more generic information available from other sources. In Switzerland, the Topten expertise is used in specific research projects to conduct feasibility studies and create information materials for end-users, procurers, and retailers. In Luxembourg, it is used to support municipalities by maintaining a public list of municipalities subsidizing energy-saving appliances. The collaboration ensures that the regulations align with the latest information on energy-efficient devices available in the local market. Energy advisers recommend Topten as a reliable source of information for individuals. In Poland, the local energy agency has been organising a competition for windows' and doors' manufacturers in collaboration with Topten for many years. Results are presented in seminars, industry conferences, at universities, and mainly to building designers and architects.

Though the calculator and the competitions were not heavily used by the interviewed stakeholders, they underlined their **appreciation of**:

- The service as a whole: a user-friendly interface to find and easily compare products and make informed choices
- The guidelines and the product lists (particularly regarding energy consumption and F-Gas for professional buyers)
- The policy input on EU regulations, or to improve energy certificates by setting higher benchmarks for products on the market, exceeding the thresholds for subsidies in the certificate scheme
- Information on the importance of building insulation
- Information emphasizing the environmental benefits of products, beyond the sole financial aspects
- Information about maintenance advice

Suggestions from policy stakeholders and policy makers for improving the Topten project and its HACKS sections include:

- To promote the Topten / HACKS content
    - Analysing visitor interests and behaviour, including popular pages and drop-off points

    - Giving the website a more modern look and improve the presentation of product lists and criteria, making them easier to understand for laypersons
    - Providing a list of all the brands featured on the website
    - Investing in communication efforts to increase awareness
    - Marketing the website through installers
    - Encouraging producers to recognise Topten and promote it on their own websites
    - Raising awareness among different target audiences, including the general public and installers.
- To expand the Topten activities
    - Conducting tests on AC consumption in homes
    - Ensuring regular data updates to reflect the current market situation
    - Including more models available on the market, addressing any criteria limitations
    - Providing a breakdown of heat pumps by applied technology, such as air-to-water and brine-to-water
    - Expanding the product range for companies and professionals, such as circulation pumps for apartment complexes
    - Expanding content to include professional products
    - Providing information on financial savings, considering the evolving prices
    - Including a link to subsidies to motivate users to explore them.
    - Considering future projects focusing on water savings and their relation to energy savings

2.6 Feedback from utilities

The interviewed utilities **support energy efficiency in general and renewable energy**, they often have been collaborating with Topten for many years.

While the pandemic had a limited impact on on-site consultations while visiting clients, online consultations increased. The energy crisis has significantly affected the demand for advice, with a surge in inquiries from households and companies. The interest in generating one's own energy, particularly through PV panels, replacement heating, and electromobility, is also prevalent. In Switzerland, the use of tools like "the energy assistant" has witnessed a notable rise in users, and rebate programmes are performing well. In Italy, the small cooperative utility has experienced substantial growth, expanding its employees from 3 to 8 thanks to a collaboration with a bank in order to manage the current governmental incentives scheme effectively.

Utilities collaborate with Topten/ HACKS in various ways to promote energy efficiency and support rebate programmes. They rely on the product lists provided by Topten to identify efficient appliances for awarding subsidies. In Switzerland, Topten manages directly subsidy programmes for efficient devices, such as fans and shower heads, and supports utilities across different product categories with guides (for both business and private costumers, subsidies are based on Topten's product lists). Utilities engage in shared communication with Topten, ensuring beneficiaries are aware of the available financial support.

In terms of common communication activities, articles created by or in collaboration with Topten are published on utilities' blog pages, focusing on heating, cooling, and other efficiency topics. Brochures, website links, and advertising materials are created collaboratively. In Czech Republic, Topten provided energy-saving tips and calculations for the utility communication; in Italy, Topten organised webinars, communication campaigns, and radio programmes to raise awareness and provide information on topics related to heating, cooling, and energy savings.

Overall, utilities appreciate the added value gained through cooperation with Topten and express satisfaction with the ongoing projects**. Suggestions from utilities for improving the Topten project and its HACKS sections include:**

- Include the "Energy Saving Tips & Tricks" in a subpage to make them more easily accessible and reduce current space usage
- Direct customers via links to official websites of public services for further information
- Customize the HACKS calculator to better meet specific needs
- Introduce a comparison function for appliances, which would add an exciting feature to the website
- Enhance the look and feel of the website to give it a more modern design
- Ensure the inclusion of both financial and environmental information for products
- Emphasize the main message of "What are the best products at the best price (and do I get a subsidy)?" more prominently on the website
- Improve communication strategies, such as involving influencers to convey the message effectively
- Consider providing training activities for technicians collaborating with utilities, especially regarding issues related to heating, cooling, and air conditioning (HAC)
- Maintain and continue the collaboration with radio programmes for effective communication

2.7 Feedback from NGOs

The interviewed NGOs actively support environmental issues and therefore promote energy efficient products in many ways, but they also deal with energy poverty, which often worsened because of the pandemic and of the energy crisis.

During the pandemic, there was no significant change in the energy sector (though it halted many activities in various sectors). However, the Russian aggression in Ukraine and the subsequent energy crisis led to skyrocketing energy prices which brought about a stronger focus on political communication regarding energy-saving measures in the building sector. The importance of efficiency and sufficiency measures for achieving energy independence, climate protection, and cost reduction was emphasized by environmental organisations. The energy crisis has increased the pressure in the municipalities to switch to heating systems using renewable energies. Oil or gas heating systems are no longer even considered by political representatives. However, the transition also means that the municipalities and other public actors have to be accompanied more intensively on this path. Demand for efficient heating is concentrated on heat pumps, which is a good product but only if buildings are insulated - otherwise the grid will have to manage very high demand peaks.

The pandemic also accelerated the shift to online platforms. It also witnessed the spread of fake news and misinformation, highlighting the importance of reliable information sources like Topten. By using the website, stakeholders could access verified and trustworthy information.

NGOs have collaborated with Topten in various ways to exchange technical expertise and enhance communication on energy-related issues. Overall, the collaboration between NGOs and Topten has facilitated knowledge exchange, public awareness campaigns, and the development of educational materials, furthering the organisations' efforts in promoting energy efficiency and sustainability. NGOs have promoted TOPTEN through various channels, including mailings to local authorities, businesses, and other institutions. For example:

- In Germany, they have cooperated on topics such as heating technology and digitalization in the heating sector. Topten's expertise and content have been valuable in NGO's work related to energy-efficient heating solutions in buildings, supporting consumer workshops and providing information on funding programmes for efficient heating and cooling technology.
- In the Czech Republic, the HACKS content (tips) was used to raise awareness about energy efficiency.
- In France, the Topten expertise on HAC was used in a working group on heat pumps and for an interview in the NGO's regular publication.
- In Lithuania, it was used in tools during training courses on saving energy: recommendations were formulated and submitted to relevant institutions, with expectations for further collaboration in areas such as renovation and installation of PV panels and of heat pumps.
- In Sweden the HACKS content was integrated in NGOs' proposed school material about energy with calculation exercises and fact sheets. Students used information from the Topten website to complete the exercises and learn about energy concepts. These collaborations aim to provide relevant material for schools and raise awareness among students about energy use and efficiency.

Suggestions from NGOs for improving the Topten project and its HACKS sections include:

- Enhancing the calculator or providing user guidance to improve its usability.

- Improving the vocabulary and clarity of technical terms, especially for complex appliances like heat pumps (e.g. high temperature for technicians means 80°C not 55°C)
- Adding more product categories
- Adding detailed information on environmental aspects and consequences.
- Adding more information on which heating system is more suitable in which case (e.g. in drinking water protection zones, deep drilling for brine-to-water heat pumps is not permitted)
- Adding more information on grey energy during the equipment production phase, and also on maintenance costs (e.g. when yearly controls are mandatory)
- Developing a product comparator feature for easier comparison.
- Making the website more accessible, particularly the mobile version and display of lists
- Adding information on the benefits of energy-efficient products for air quality (as it aligns with current trends and media attention).

3 Conclusions

The feedback received from the different stakeholder groups on Topten usability, HACKS content and overall effectiveness, has been generally positive, which is not surprising considering that the interviewed stakeholders in their great majority work together with Topten and benefitted from the HACKS project. In this sense, the interviewed stakeholders are representative of the 245 organisations that have engaged in a partnership with the HACKS partners and of some of the most involved consumers who accepted a short interview.

HACKS has brought enough value for those stakeholders to motivate them and have them invest time and resources in common projects and collaboration, undoubtedly demonstrating a strong interest in the project. They found that **HACKS has brought them**:

- Impartial, scientific, and yet concrete and solution-oriented information (in their language) produced by an independent and internationally recognised network.
- Highly specialised information on a very specific topic – review of equipment with regards to energy performance – that is often complementary to their own activity and that no other organisation or network is able to provide.
- Support for their activity – whatever it was, i.e. confirming that Topten is a multi-focus tool that is used by a whole range of various stakeholders.
- In some cases, the essential basis for some of their activities that would exist differently (if at all) without the Topten benchmarks, such as rebate programmes.

It is difficult to get numbers from the stakeholders on sales of best products or pieces of advice related to HACKS content. But it is unquestionable that HACKS contributed to a great extent to the promotion of energy efficient devices, sometimes in a difficult context.

Most of the tools developed and maintained during the HACKS project – the products lists and reviews, the selection criteria pages, the advice and tips' pages, including the one covering low- and no-cost measures to save energy and reduce energy bills in a hurry, the Pro Guidelines, the raffles, etc. – seemed to be used and very much appreciated. The use of the HACKS calculators (for winter and summer) were less “voted-in”, with on the one hand manufacturers and installers often assessing them as not enough performing or detailed compared to their existing alternatives, and, on the other hand, the other stakeholders, including individual consumers, finding them too complex to be used without an accompanying person.

However, as in the evaluation of previous projects and despite continuous work on communication and software issues since then, **stakeholders would like to get "more" from Topten and HACKS**:

- **More visibility:** as several stakeholders underlined it is a pity (an it is also blocking their own involvement in the project) that “so few people” know about Topten and HACKS.
- **More modernity** for the website: changes in design, new features, improvement of the user experience.
- **A wider scope of action**:
    - More information on the environmental context, beyond the financial impact of choosing best technologies and reducing energy demand.
    - More background guidance on heating systems choices (not only the product but the type of heating) and building insulation.
    - More details about each product
    - More products covered, e.g. from the professional sector

- More parameters covered: CO_2 emissions, resource efficiency, durability, reparability
- More product testing
- More market research to provide input to the regulatory process
- Future upstream information on water savings

Finally, almost all interviewed stakeholders seem to assume that Topten will continue delivering its free of charge HACKS information in the future, helping out installers, retailers, consumers, professional buyers, and participating to the development of the coming European product-related regulations. It is as though they acknowledge that Topten is an established operator that fulfils a mission of public interest.

It should be noted that the Topten consortium is motivated and invested in a continuation of all those activities that produce such an added value to the connected stakeholders; additional developments to further increase this added value are in part already being implemented and in part could be developed in the future. Prerequisite for both the continuation as well as the further development is a sustainable funding of the project (cf. D6.7).

4 Lists of interviewed stakeholders and questionnaires

4.1 AT - Austria

Organisation	Type of stakeholder
Male 60 year old	Consumer at the fair “Welser Messe”
Female 40 year old	Consumer at the fair “Welser Messe”
Chamber of Commerce Deputy Managing Director, Electrical and Furniture Trade Division	Retailer

4.1 BE - Belgium

Organisation	Type of stakeholder
Attb, association representing the thermic heating sector	Manufacturer
Daikin	Manufacturer
Varey	Retailer (wholesaler)
FOD, federal agency for environment	Public Authority
VEKA, Flemish agency for energy and climate	Public Authority

4.2 CH – Switzerland

Organisation	Type of stakeholder
Female winner of one of the HACKS competitions	Consumer
TCA Thermoclima	Installer
SFOE Swiss Federal Office of Energy	Public Authority
ewz	Utility
ekz	Utility

4.3 CZ - Czech Republic

Organisation	Type of stakeholder
Consumer recruited for interview thanks to the competition	Consumer
Prague 7, city district	Public authority
ZKM	Installer
People in need	NGO
Centropol	Utility

4.4 FR - France

Organisation	Type of stakeholder
Male interviewed after a training session	Consumer
Independent installer	installer
ADEME (person in charge of heating and cooling)	Public Authority
CLER, network for ecological transition	NGO
Heat Pump Expert	NGO

4.5 DE - Germany

Organisation	Type of stakeholder
Consumer, winner of one of the raffles	Consumer
BUND	NGO
Idealo	Comparison website / Retailer
SHK Innung Berlin	Installer
Federal environmental Agency	Public Authority

4.6 ES - Spain

Organisation	Type of stakeholder
Consumer, recruited via a raffle	Consumer
Consumer, recruited via social networks	Consumer
Independent installer	Installer
NGO	NGO
Ecodes training for municipalities department	NGO

4.7 IT - Italy

Organisation	Type of stakeholder
Consumer, recruited via the raffle	Consumer
Independent Installer	Installer
Retailer association	Retailer
Legambiente	NGO
Cooperative Utility	Utility

4.8 LT - Lithuania

Organisation	Type of stakeholder
Consumer recruited via a consumer association	Consumer
Lithuanian Energy Agency	Public authority
SoliTekn solar panel manufacturer	Manufacturer
Zirmunai-Tuskulenai	NGO
Vilpra	Retailer / Installer

4.9 LU - Luxembourg

Organisation	Type of stakeholder
Association of municipalities	Policy makers
Citizen Cooperative	NGO
Installer	Installer
Consumer, recruited within the organisation	Consumer
Climate adviser	NGO

4.10 PL - Poland

Organisation	Type of stakeholder
Consumer, recruited via the competition and social networks	Consumer
Consumer, recruited via the competition and social networks	Consumer
Consumer, recruited via the competition and social networks	Consumer
Polish Chamber of Ecology	NGO
Lower Silesian Energy and Environment Agency	Public authority

4.11 PT - Portugal

Organisation	Type of stakeholder
ADENE	Public Authority

4.12 SE - Sweden

Organisation	Type of stakeholder
SSNC School Department	NGO
Consumer, acquaintance	Consumer
Consumer, acquaintance	Consumer
Municipality	Public Authority
Energy expert	Public Authority

4.13 UK - United Kingdom

Organisation	Type of stakeholder
Unified Water Label	Manufacturer
Stove Industry Association	Manufacturer
Consumer, recruited via social networks	Consumer
Consumer, recruited via social networks	Consumer
Consumer, recruited via social networks	Consumer

Questions targeting consumers

- How did you hear about Topten and in particular its HAC activities?
- What was your interaction(s) with the Topten project?
- Has this changed with the pandemic, or with the current energy crisis and necessity to save energy?
- In products, what is the relative importance of performance, quality (e.g., reliability, durability) and costs? Please rate the various items from 1 (low) to 5 (High).
- If you bought a product, did you follow the Topten selection criteria? Why?
- Did you visit:
    - the product lists: Yes / No
    - the selection criteria pages: Yes / No
    - the advice pages: Yes / No
    - the calculator (if yes, did you use it? Why? The winter calculator / and or the summer calculator?): Yes / No
    - the competition / raffle page: Yes / No
    - Others (e.g. shop-link, newsletter, Topten logo, etc.): _____
- Did you find the information on other benefits than financial savings interesting? (e.g. environmental benefits, air quality benefits)
- How could Topten improve in future to increase its added value for you?
- Additional comments

Questions targeting installers

- General information about your organisation relating to activities in supporting energy efficiency (e.g. small independent installer or part of a large network, dealing with only one brand or more freedom, level of intervention: national/regional/local, etc.)
- How did you hear about Topten and in particular its HAC activities?
- Can you describe your cooperation with the Topten project in brief?

- Has this changed with the pandemic, or with the current energy crisis and necessity to save energy?
- What is the relative importance of performance, quality (e.g., reliability, durability) and costs? Please rate the various items from 1 (low) to 5 (High).
- Did the product range of the products you install change due to Topten? If Yes, what are the improvements (new kind of product, new brands, new models?)
- Which specific tools of the Topten websites did you use? What did you think about them?
    - the product lists
    - the selection criteria pages
    - the advice pages
    - the calculator? The winter calculator / and or the summer calculator? (e.g. to use its results in your approaching your costumers)
    - the competition / raffle pages
    - Pro guidelines
    - Others (e.g. shop-link, newsletter, Topten logo, etc.): _____
- Which of these tools could be improved? How?
- Did you find the information on other benefits than financial savings interesting? (e.g. environmental benefits, air quality benefits)
- How could Topten improve in the future, to increase its added value for you?
- Additional comments

Questions targeting manufacturers

- General information about your organisation relating to activities in supporting energy efficiency (what kind of products, markets – national, EU, other?).
- Can you describe your cooperation with the Topten project in brief?
- Has this changed with the pandemic, or with the current energy crisis and necessity to save energy?
- What is the relative importance of performance, quality (e.g., reliability, durability) and costs? Please rate the various items from 1 (low) to 5 (High).
- Did the product range of your products change due to Topten?
- Could you observe an increase of sales numbers of your Topten products?
- How important is it for you to be listed/to be number one on the Topten website?
- Which specific tools of the Topten websites are most important for you?
    - the product lists
    - the selection criteria pages
    - the advice pages
    - the calculator? The winter calculator / and or the summer calculator? (e.g. to use its results in your approaching your costumers)

    - the competition / raffle pages
    - Pro guidelines
    - Others (e.g. shop-link, newsletter, Topten logo, etc.): _____
- Which of these tools could be improved? How?
- Did you find the information on other benefits than financial savings interesting? (e.g. environmental benefits, air quality benefits)
- How could Topten improve in the future, to increase its added value for you?
- Additional comments

Questions targeting retailers

- General information about your organisation relating to activities in supporting energy efficiency (kind of product sold, kind of retailer (on-line, part of a large chain, specialised, independent, etc.?).
- Can you describe your cooperation with the Topten project in brief?
- What is your motivation to participate in Topten?
- Has this changed with the pandemic, or with the current energy crisis and necessity to save energy?
- What are your main criteria for the selection of brands/technologies/product models?
- What is the relative importance of performance, quality (e.g., reliability, durability) and costs? Please rate the various items from 1 (low) to 5 (High).
- How critical is the price criterion in your opinion/in the opinion of your customers?
- Could you observe an increase of sales numbers of Topten products (in%, in absolute numbers)?
- Which specific tools of the Topten websites are most important for you?
    - the product lists
    - the selection criteria pages
    - the advice pages
    - the calculator? The winter calculator / and or the summer calculator? (e.g. to use its results in your approaching your costumers)
    - the competition / raffle pages
    - Pro guidelines
    - Others (e.g. shop-link, newsletter, Topten logo, etc.): _____
- Which of these tools could be improved? How?
- Did you find the information on other benefits than financial savings interesting? (e.g. environmental benefits, air quality benefits)
- How could Topten improve in the future, to increase its added value for you?
- Additional comments

Questions targeting professional buyers

- General information about your organisation relating to activities in supporting energy efficiency (public, private, large, small, etc.?).
- Can you describe your cooperation with the Topten project in brief?
- Has this changed with the pandemic, or with the current energy crisis and necessity to save energy?
- In your purchasing decision what are your main criteria for the selection of brands/technologies/product models?
- What is the relative importance of performance, quality (e.g., reliability, durability) and costs? Please rate the various items from 1 (low) to 5 (High).
- Did you carry out successful procurement activities based on the Topten documents?
- Which specific tools of the Topten websites are most important for you?
    - the product lists
    - the selection criteria pages
    - the advice pages
    - the calculator? The winter calculator / and or the summer calculator? (e.g. to use its results in your approaching your costumers)
    - the competition / raffle pages
    - Pro guidelines (if yes, in which aspects)
    - Others (e.g. shop-link, newsletter, Topten logo, etc.): _____
- Which of these tools could be improved? How?
- Did you find the information on other benefits than financial savings interesting? (e.g. environmental benefits, air quality benefits)
- How could Topten improve in the future, to increase its added value for you?
- Additional comments

Questions targeting public authorities and policy makers

- General information about your institution relating to activities in supporting energy efficiency.
- Can you describe your cooperation with the Topten project in brief?
- Has this changed with the pandemic, or with the current energy crisis and necessity to save energy?
- Does Topten help you to design policy tools, e.g. Eco-Design measures?
- Are supporting programmes based on Topten? For HAC? Why?
- Which specific tools of the Topten websites are most important for you?
    - the product lists
    - the selection criteria pages
    - the advice pages

    - the calculator The winter calculator / and or the summer calculator? (e.g. to use its results in your approaching your costumers)
    - the competition / raffle pages
    - Pro guidelines (if yes, in which aspects)
    - Topten.eu policy recommendation pages
    - Others (e.g. shop-link, newsletter, Topten logo, etc.): _____
- Which of these tools could be improved? How?
- Did you find the information on other benefits than financial savings interesting? (e.g. environmental benefits, air quality benefits)
- How could Topten improve in the future, to increase its added value for you?
- Additional comments

Questions targeting utilities

- General information about your organisation relating to activities in supporting energy efficiency (kind of company, large, small, green electricity etc.?).
- Can you describe your cooperation with the Topten project in brief?
- Has this changed with the pandemic, or with the current energy crisis and necessity to save energy?
- Are supporting programmes based on Topten? For HAC? Why?
- Do you have shared communication with Topten?
- Which specific tools of the Topten websites are most important for you?
    - the product lists
    - the selection criteria pages
    - the advice pages
    - the calculator The winter calculator / and or the summer calculator? (e.g. to use its results in your approaching your costumers)
    - the competition / raffle pages
    - Pro guidelines (if yes, in which aspects)
    - Others (e.g. shop-link, newsletter, Topten logo, etc.): _____
- Which of these tools could be improved? How?
- Did you find the information on other benefits than financial savings interesting? (e.g. environmental benefits, air quality benefits)
- How could Topten improve in the future, to increase its added value for you?
- Additional comments

Questions targeting NGOs and consumer organisations

- General information about your organisation relating to activities in supporting energy efficiency (consumer association, environmental association, religious organisation, other?)

- Can you describe your cooperation with the Topten project in brief?
- Why do you promote Topten?
- Has this changed with the pandemic, or with the current energy crisis and necessity to save energy?
- By which measures do you promote Topten?
- Which specific tools of the Topten websites are most important for you?
    - the product lists
    - the selection criteria pages
    - the advice pages
    - the calculator The winter calculator / and or the summer calculator? (e.g. to use its results in your approaching your costumers)
    - the competition / raffle pages
    - Pro guidelines (if yes, in which aspects)
    - Others (e.g. shop-link, newsletter, Topten logo, etc.): _____
- Which of these tools could be improved? How?
- Did you find the information on other benefits than financial savings interesting? (e.g. environmental benefits, air quality benefits)
- How could Topten improve in the future, to increase its added value for you?
- Additional comments