HEATING AND COOLING
KNOWHOW AND SOLUTIONS

HACKS

D6.2 – Final project report summarising the quantitative evaluation of the impacts

Consumer involvement, GHG emission reduction, energy savings, uptake of energy efficient products and services

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March 2023

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European portal www.topten.eu/hacks

Project partners and websites

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 845231.

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.

Executive summary

The HACKS project included a continuous task to monitor and evaluate if the project was on track and in the end achieved to deliver the expected impact in terms of consumer involvement, Green House Gas (GHG) emission reduction & energy savings as well as the uptake of energy efficient products and services by the end of the project.

All project partners reported figures for a set of joint key performance indicators and other relevant indicators covering the implementation of consumer outreach campaigns as well as multiplier outreach campaigns on national levels.

The overall project's impact relied on consumer involvement (activities related to web pages and media) as well as stakeholder involvement (activities related to installers, retailers, consumer associations, manufacturers and others) contributing almost evenly to the general targets.

A set of key performance indicators included defined metrics, targets (with breakdown of indicative national targets as applicable) and an indication for which of the main impact levels the parameters were valid for. Beyond that, a number of other parameters mainly used to monitor the level of consumer involvement was specified as well.

This report includes a final assessment of KPIs, which were defined either for the period "last 18 months of the project" (i.e. in cruising speed) or "project duration". To compensate significant restrictions caused by COVID 19 which affected the overall project implementation, the project consortium was allowed to extend the project duration by 6 months. KPIs initially defined for the last project year, were assigned to the period "the last 18 months".

Although the project had to cope with unforeseen challenges, the final assessment of the impacts shows very positive results. All KPIs except the KPI 10 "Interviews" were met and lots of them showed a percentage of 200% and more concerning their level of achievement. A detailed description of the results for the main impact areas "consumer involvement", "GHG emission reduction & Energy Savings" and "Uptake of energy efficient products and services" is provided in Chapter 3.

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Acronyms

GHG: Greenhouse Gases

HAC: Heating and Cooling

KPI: Key Performance Indicator

1 Introduction

The HACKS project monitored and evaluated a set of key performance indicators (KPIs) and other relevant indicators corresponding to the various tasks accomplished in the framework of the consumer outreach campaign (WP4) as well as the multiplier outreach campaign (WP5) at the national levels. Even though a variety of actions were implemented not evenly in all partner countries, all project partners used the same KPIs and metrics to ensure relevant European-wide comparison and evaluation. All partners have contributed to this monitoring on a regular basis by feeding in data in spreadsheets.

The monitored indicators are used as input parameters for a calculation model supporting the impact assessment on the following levels:

- Consumer involvement,
- Green House Gas (GHG) emission reduction & energy savings, as well as the
- Uptake of energy efficient products and services.

The overall project's impact relies on the following main elements and pillars as described below:

Impact generated from	HACKS activities monitored, allowing to verify the impact	Share of impact
A - Consumer involvement campaign (55 %)	Web pages	40%
	Media contacts	15%
B - Stakeholder involvement campaign (45%)	Stakeholders (installers, retailers, consumer associations, other multipliers)	30%
	Actions targeting manufacturers	15%

Figure 1: Upstream hypothesis on the sources of project impact

The calculation model covers a set of basic assumptions (as outlined in the Grant Agreement) including aggregated specific savings (over product lifetime) for each of the main elements mentioned above. This report makes reference to these assumptions for calculating the savings without replicating the comprehensive justification of these assumptions.

This report provides a final quantitative evaluation of the impacts of the HACKS project based on monitored data for the entire project duration September 2019 – February 2023. This report includes a final assessment of KPIs, which were defined either for the period "last 18 month of the project" or "project duration". To compensate significant restrictions caused by COVID 19, significantly affecting the overall successful project implementation, the project consortium was allowed to extend the project duration by 6 months. KPIs initially defined for the last project year, were assigned to the period "the last 18 months". Details can be found in chapter 2.1.

This assessment report covers three main elements, first the overview of the defined input parameters, second the status of these based on data monitored for the predefined periods and the final impact assessment.

2 Overview of defined input parameters and final assessment of targets for the predefined periods

This section includes the description of the key performance indicators (KPI) in the narrow sense as defined in the Grant Agreement (first sub chapter) as well as other indicators, which are mainly used to monitor the level of consumer involvement (second sub chapter).

For all KPIs the following sub chapter includes a standardized reporting format:

The specific metric and target for the defined period as well as for the entire project duration (when applicable) is detailed for each of the parameters. For every KPI, the percentage of achievement (actual monitored value divided by the target value) is indicated as well.

Furthermore, a reference is given concerning the source of impact – either from the consumer involvement campaign (area A) or from the stakeholder involvement campaign (area B).

Finally, information is provided regarding which of the main areas the specific parameter is contributing to:

- Consumer involvement

In the framework of this project, "consumer involvement" is defined as actions undertaken by consumers to proactively get information on heating and cooling solutions with the view of lowering their energy bills, mainly as result of purchasing new, energy efficient equipment or of implementing solutions improving their comfort and health environment.

This proactive engagement is not reduced to the mere presentation of information but considers the consumers having an interaction with the HACKS project. These interactions were monitored to derive the level of consumer involvement.

In the HACKS context, activities set by consumers are "translated" into consumer involvement. Several consumer "activities" (like media contacts, use of HACKS online calculator, participation in raffles) are converted to "involvements" by applying conversion factors. Further details for these conversion factors can be found in the section 3.1 "Assessment of consumer involvement".

- GHG emission reduction & Energy Savings

Assumptions for specific final energy savings were applied for several input areas (web pages, media, stakeholder involvement and manufacturer involvement as mentioned above) and summed up for final energy savings. Based on these figures, savings for primary energy savings and Greenhouse gases were calculated.

- Uptake of energy efficient products and services

The availability of energy efficient products is key for the domestic uptake of energy efficient products. This project achieved an increase in the uptake benefitting from partnerships with installers and retailers as multipliers that promote more efficient material.

The selected inputs as KPIs were applied in line with the calculation model aiming at an appropriate simplification of input levels. The underlying calculation model was included in the Grant Agreement and successfully applied for the interim quantitative assessment (Deliverable 6.1). It has to be acknowledged that these parameters may have effects in other areas as well, even if they were not used as input for the impact assessment. To better illustrate this, KPI 1 "page views on HACKS" website" was processed for calculating the "Consumer involvement" and "GHG emission reduction & Energy Savings" but not "Uptake of energy efficient products and services", though there was an indisputable effect for that level as well.

Some of the parameters covered by this evaluation task are not directly related to the three main areas as outlined above. However, monitoring these was deemed relevant, as they serve as foundation for others and therefore provide insights.

Related details concerning activities covered by the KPIs can be found in Deliverables D4.5, D4.7, D5.3, D5.5 and D6.5.

2.1 Key performance indicators

KPI 1: Online platforms

Metric	Page views on the HACKS webpages	
Target	900,000 page views in the last 18 months of the project[1] All 15 national platforms as well as the EU level platform topten.eu	
Result | OK	**"18-month period": 1.28 Mio. page views** (Percentage of achievement: 125%) "Project duration": 2.6 Mio page views	
Source of impact	Consumers	
Input parameter relevant for …		
Consumer involvement	GHG emission reduction & Energy Savings	Uptake of energy efficient products and services
✓	✓	✘

KPI 2: Media outreach

Metric	Media contacts (on-line, printed, social networks)	
Target	20 million media contacts in the last 18 months of the project	
Result | OK	**"18-month period": 56.61 Mio. media contacts** (Percentage of achievement: 283%) "Project duration": 70.15 Mio page views	
Source of impact	Consumers	
Input parameter relevant for …		
Consumer involvement	GHG emission reduction & Energy Savings	Uptake of energy efficient products and services
✓	✓	✘

[1] With the Amendment Reference No AMD-845231-11 entering into force in June 2022, the applicable timeframe for KPIs, initially defined for „the last year of the project" has been changed to „the last 18 month of the project", hence the period for assessment covers September 2021 to February 2023.

Definition of “media contact” in the context of HACKS: A reader, a listener or a viewer has been in contact with the project such as through a published article (printed or web media), as part of a television programme, advertisement placed in printed/not printed media.

KPI 3: Manufacturers of HAC Equipment

Metric	Partnerships with involved manufacturers	
Target	30 involved manufacturers in last 18 months of the project	
Result | OK	**“18-month period”: 62 manufacturers involved** (Percentage of achievement: 207%) “Project duration”: same value applies as mentioned above	
Source of impact	Stakeholders	
Input parameter relevant for …		
Consumer involvement	GHG emission reduction & Energy Savings	Uptake of energy efficient products and services
✘	✓	✘

KPI 4: Consumer organisations
KPI 5: Partnerships with installers and retailers
KPI 6: Other multipliers

Metric	Partnerships	
Target	100 partnerships in the last 18 month of the project (for consumer organisations, installers, retailers and other multipliers together)	
Result | OK	**“18-month period”: 245 partnerships with stakeholders** (Percentage of achievement: 245%) “Project duration”: same value applies as mentioned above	
Source of impact	Stakeholders	
Input parameter relevant for …		
Consumer involvement	GHG emission reduction & Energy Savings	Uptake of energy efficient products and services
✘	✓	✓

KPI 7: Policy and measures

Metric	Policy and recommendation papers at the EU level	
Target	2 over the project duration	
Result | OK	**"Project duration": 23**	
Source of impact	NA	
Input parameter relevant for …		
Consumer involvement	GHG emission reduction & Energy Savings	Uptake of energy efficient products and services
✘	✘	✘

Note for this and the following KPIs (7 & 8):
Even if these impacts, initiated by actions targeting the policy level on EU and national level and monitored as KPIs 7 and 8, cannot be linked to and counted directly for the impact areas "Consumer involvement", "GHG emission reduction & Energy Savings" and "Uptake of energy efficient products and services" (as mentioned in the table above), they are definitely real but difficult to measure. Aside from quantitative impacts (as outlined in this Deliverable), the Topten activities undertaken within the HACKS project have impacts on the market on a higher level. Details for this qualitative impact level can be found in Deliverable 5.5, inter alia including the case study on conform fans. This case study contributed to the development of Minimum Energy Performance Standards and a label for fans. In this context it has to be emphasized that HACKS as element of the European Topten initiative is and remains a valuable source of benchmarks and market status in order to uncover untapped energy potentials on the European market.

KPI 8: Policy and measures

Metric	Policy and recommendation papers at the national and local level	
Target	30 over the project duration	
Result | OK	**"Project duration": 71**	
Source of impact	NA	
Input parameter relevant for …		
Consumer involvement	GHG emission reduction & Energy Savings	Uptake of energy efficient products and services
✘	✘	✘

KPI 9: Stakeholders contacted

Metric	Stakeholders in contact with the project information	
Target	2,250 stakeholders informed over the project duration	
Result | OK	**“Project duration”: 3,413 stakeholders informed** (Percentage of achievement: 152 %)	
Source of impact	NA	
Input parameter relevant for …		
Consumer involvement	GHG emission reduction & Energy Savings	Uptake of energy efficient products and services
✘	✘	✘

KPI 10: Stakeholder interviews

Metric	Qualitative interviews providing feedback on their use of the HACKS’ input and tools	
Target	75 interviews over the project duration (5 per country)	
Result | OK	“Project duration”: 64	
Source of impact	NA	
Input parameter relevant for …		
Consumer involvement	GHG emission reduction & Energy Savings	Uptake of energy efficient products and services
✘	✘	✘

KPI 11: Case studies

Metric	Case studies for communication purposes At least 30 case studies over the project duration
Target	30 case studies over the project duration
Result | OK	“Project duration”: 32

Source of impact	NA	
Input parameter relevant for …		
Consumer involvement	GHG emission reduction & Energy Savings	Uptake of energy efficient products and services
✘	✘	✘

2.2 Other indicators

Beyond the defined Key Performance Indicators, other indicators have been monitored regarding consumer involvement:

- HACKS calculators use
- Participation in national HACKS raffles
- Participation in HACKS European competitions

Further details regarding these parameters are provided in the Deliverable 4.5 «Final report on the consumer involvement campaign, its results across Europe and activities to increase consumer involvement».

3 Final impact assessment

This chapter covers the final assessment for the main areas as introduced in Section 2, namely "consumer involvement", "energy savings and GHG emission reduction" as well as "uptake of energy efficient products and services".

3.1 Assessment of consumer involvement

In order to relate project activities to actual involved consumers, assumptions were made to set conversions factors to link these aspects and take into account the type of the interaction between the HACKS project and consumers. The following table provides an overview of the conversion factors applied for the final assessment.

Table 1: Overview of conversion factors

Activity (Involvement after …)	Conversion factor [activity level] = 1 involvement
Media publication / Publication in consumer media	37.5
Use of HACKS calculators	1
Participation in raffles and competition (answering question of HAC topics)	2

The conversion factor for media activities (37.5) is used as an average for media publication (25) and for publication in consumer media (50). The metric "consumer involvement" was derived from relevant consumer activities monitored throughout the project and multiplied

with conversion factors as listed above. The following table includes the total value for "involved consumers" and values for the various sectors.
The values for "Involved consumers" are calculated by dividing the "Number of specific activity" by the individual "Conversion factor" (cf. table below).

Table 2: Calculation of consumer Involvement

Consumer involvement per ….	Number of specific activity	Conversion factor	Involved consumer
… media contact	70.153 Mio	37.5	1,870,747
.. use of HACKS calculator	10,940	1	10,940
Participation in raffles and competition	73,500	2	36,750
TOTAL			1,918,437

The assessment of consumer involvement – considering the entire project period – sums up to a total value of around 1.9 million.

3.2 Assessment of energy savings and GHG emission reduction

The assessment of energy savings follows directly the concept as described in the Grant Agreement, using the specific savings outlined in the impact chapter. In contrary to the area of consumer involvement, final energy savings were calculated as annual savings (the last 12 months of the project). The following table details the savings generated for the main areas "consumers" and "stakeholders".
According to the underlying calculation model, "specific savings" in kWh were assumed per parameter. For parameter "page views" a value of 90 kWh (over product lifetime) per page view was set. The basis for this value first contains assumptions how many page views would be needed to achieve the savings per product group, considering different levels of ambition per product group (more for heating products, much less for comfort fans, being cheaper and easier to install) and second the sum for relevant product categories (ACs, comfort fans, heating, etc.). For the calculation of the "Savings" (in GWh) the value of the relevant KPI was multiplied by "Specific Savings" (in kWh) as shown in the table below).

Table 3: Calculation of energy savings for the last 18 months of the project

Savings generated per ….		Value	Specific savings [kWh]	Savings [GWh]
Consumer	… page views	1,128,244	90	101.5
	… media contacts	56,610,995	1.5	84.9
Stakeholder	… manufacturer involvements	62	1,000,000	62.0

	… partnerships	245	600,000	147.0
TOTAL SAVINGS				
Final Energy				395.5
Primary Energy				**988.6**

The calculated primary energy savings of 988.6 GWh (for a period of 18 months) scaled to a 12-month period - 659.1 GWh – significantly exceeds the target value for annual average savings of 375 GWh. As the target values for GHG emission savings (75,000 tCO_2/year) are directly based on those for energy savings (applying a factor of 500 between tCO_2 and GWh_{el} as final energy, with reference to the database Ecoinvent V3.3, GWP 100 (IPCC2013)) the target value is exceeded by far as well (with a calculated value of 131,820 tCO_2 for a 12 -month period). Even if this factor could be seen as outdated and a revised value would be available, the value has been maintained for consistency purposes (comparing the initial value in the Grant Agreement as well as the value included in the interim version of this deliverable).

3.3 Assessment of uptake of energy efficient products and services

The availability of energy efficient products is key for the domestic uptake of energy efficient products. The HACKS project contributed to an increase of sales of higher efficient products thanks to its partnerships with stakeholders, in particular with installers and retailers, promoting more efficient equipment.

The following aspects were considered:

- The uptake of energy efficient products is quantified by the actual number of products being put into service within households. The partnerships with retailers and installers contribute to this. Although there is an attribution gap, these products are sold partly thanks to the project.
- Based on previous experience it was assumed that half (50%) of the projected potential energy savings over the lifetime of the products were attributable to the choice of the product. The other half was achieved through better maintenance and use practices (behaviour change).
- Specific saving potentials per product were estimated and related to the partnerships, leading to a number of sold units for each product category.

The assessment of the uptake of energy efficient products and services is based on the relation, already introduced in the Grant Agreement: “Energy efficient products sold through multiplier partnerships = savings from 100 yearly partnerships / savings potential from the product.”

With about 343,000 products sold by 245 partnerships the target as defined for the last year of the project was met.

4 Concluding remark

Although the project had to cope with unforeseen challenges (especially the COVID19 and its implications on the project implementation), the final assessment of the impacts shows very positive results. All KPIs except KPI 10 “Interviews” were met and lots of them showed a percentage of 200% and more concerning their level of achievement. The overall project performance indicators “consumer involvement”, “GHG emission reduction & Energy Savings” and “Uptake of energy efficient products and services” have been achieved.