

HARP Project – Heating Appliances Retrofit Planning Final Conference

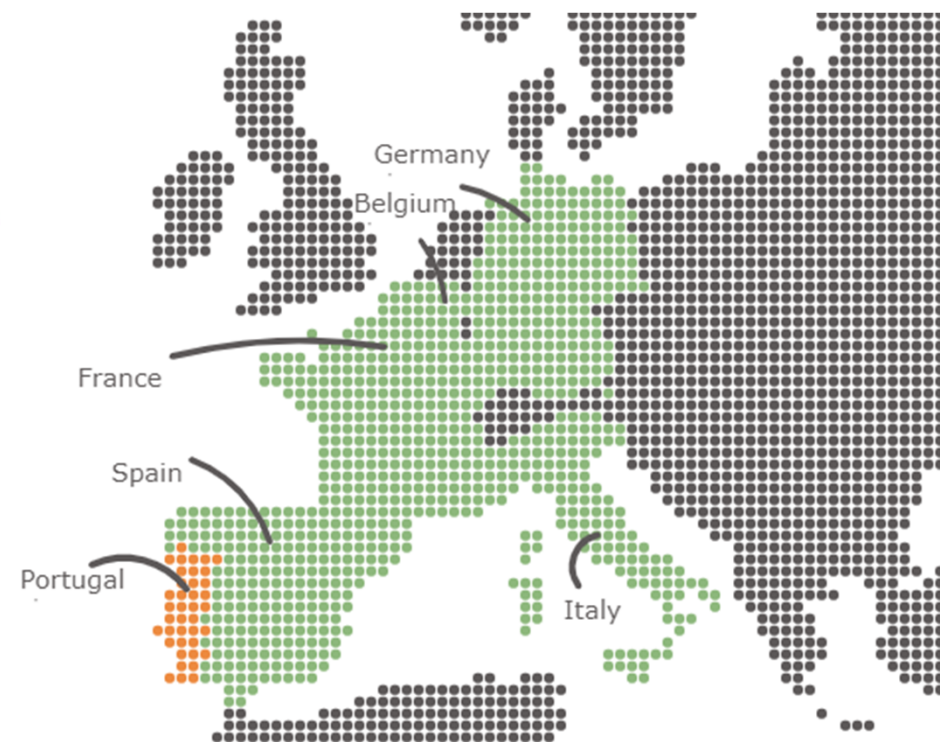
1st of July 2022, Milan

HARP CONSORTIUM



EUROPE France Germany Italy Portugal Spain

 	 seating-retrofit.eu/contact/	 	 	 	
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HEATING'S ROLE IN THE PATH FOR ENERGY EFFICIENT BUILDINGS

Energy performance of buildings directive

Revised in 2018, new revision expected in 2022, the directive will help reach the building and renovation goals set out in the European Green Deal.

Renovation wave

Renovating the EU building stock will improve energy efficiency while driving the clean energy transition.

Long-term renovation strategies

EU countries have defined strategies that foster investments in the renovation of residential and commercial buildings.

Nearly zero-energy buildings

The EU has set a target for all new buildings to be nearly zero-energy by 2020.

REPowerEU: Joint European action for more affordable, secure and sustainable energy

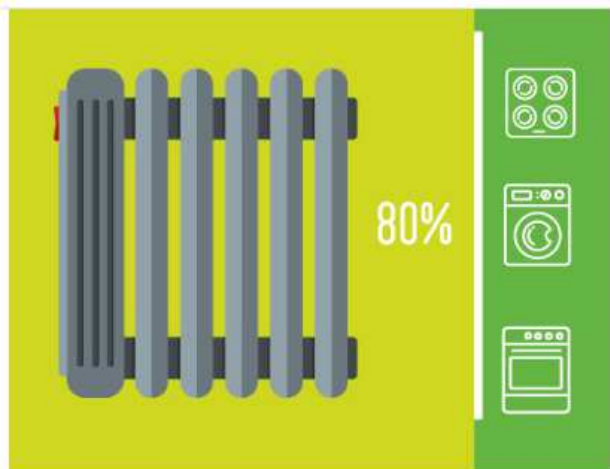
“...reducing faster the use of fossil fuels in our homes, buildings, industry, and power system, by boosting energy efficiency, increasing renewables and electrification...”

“Nearly 34 million Europeans unable to afford to heat their homes properly.”



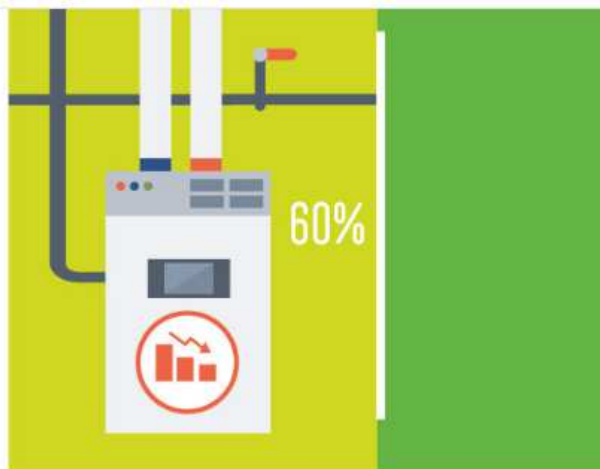
Decarbonisation of heating and cooling

HEATING'S ROLE IN THE PATH FOR ENERGY EFFICIENT BUILDINGS



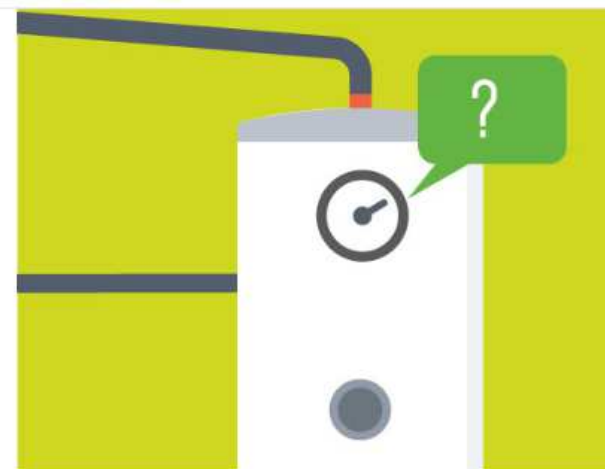
Heating and hot water represents 80% of the energy demand of EU households.

and 84% of it is generated from fossil fuels. A sharp decrease in the energy consumption and use of fossil fuels is needed for the EU to fulfil its climate and decarbonisation goals.



60% of the heating stock consists of inefficient boilers (class C or lower).

The Ecodesign and Energy Labelling regulations for boilers, in place since 2015, remove the worst performing products from the market, while driving consumers towards the most efficient choices. But installed boilers can last for over 15 years, and their replacement rate is very low (4% per year). As a result, a large number of inefficient boilers is still in use today.



Except in Germany, consumers are not informed about the efficiency of their installed heating systems.

This information is crucial to trigger a replacement of the least-efficient heating appliances. HARP will build on the experience of the mandatory labelling of installed boilers in Germany. Recommendations will be issued for the implementation of the labelling methodologies for installed heating systems at the EU-level, and specifically in countries not participating in HARP.

CONSUMER'S RELATION TOWARDS HEATING

It works 😊, all is well!

It does not work, urgente decisions are necessary:

The **consumer knows and considers the energy label** of new heating appliances:

- When acquiring a new heating equipment, **>70% of the consumers acquires the same technology it had installed before**
- **43% of the consumers** believes their house, the architectural and infrastructure characteristics, **do not allow for the installation** of a different heating solution
- **28%** doesn't know **other heating technologies**
- **25%** did not have the **time or availability** to look for more information

Source: EHI/Centerdata, October 2021)



CONSUMER'S RELATION TOWARDS HEATING

HARP's main goal is to **motivate individuals to plan the replacement of their often outdated and fossil-fuel operated heating appliances**, with more efficient and renewable alternatives.

To promote consumers conscious regarding energy efficient heating solutions the HARP consortium **invited consumers to know more about their current heating systems and plan the potential replacement of their heating system with more efficient and renewable solutions**, relying on the **energy label as the main instrument** to communicate energy efficiency.



HARP'S APPROACH

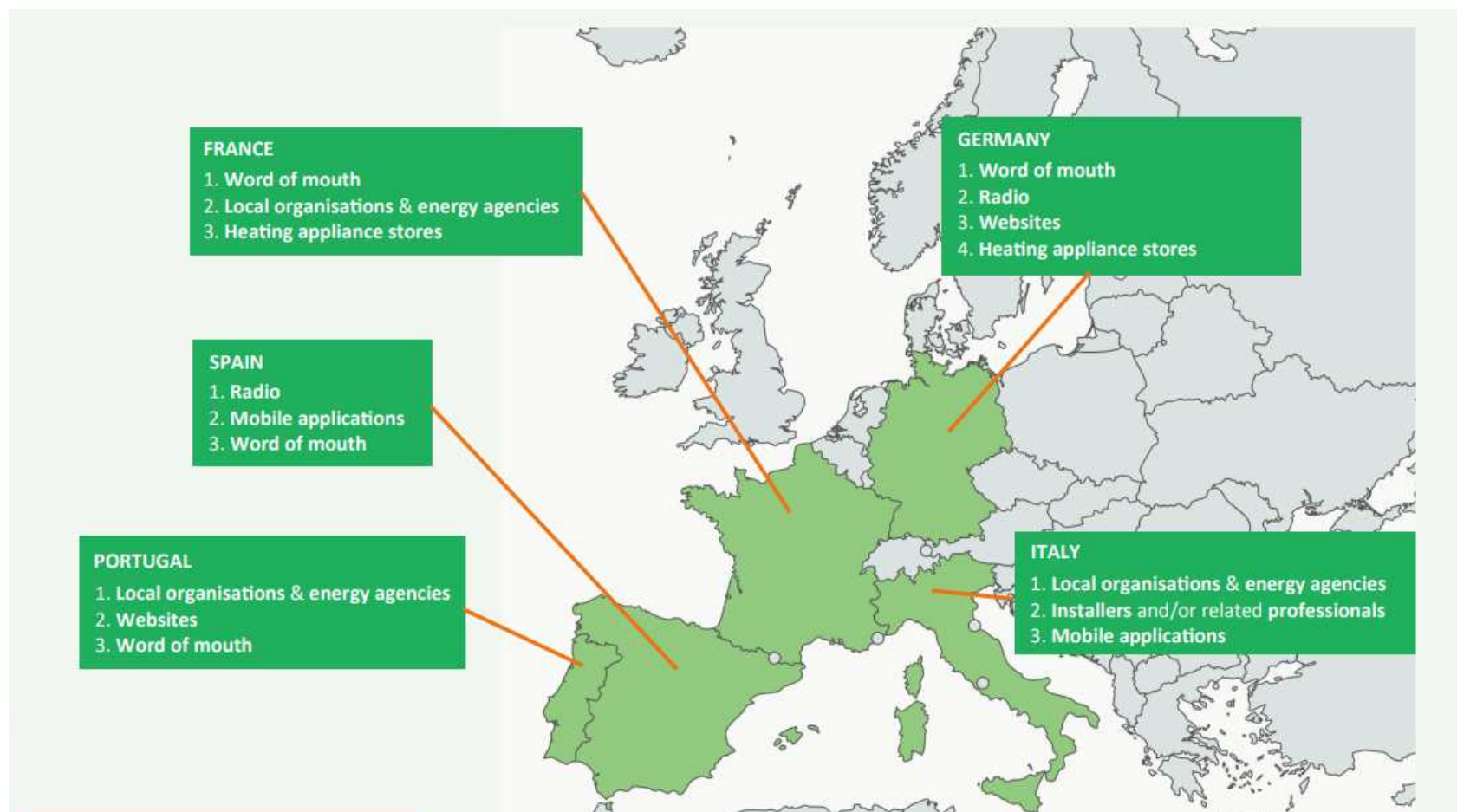
Allow the consumer to **compare, within the same basis, the label energy efficiency scale, old and new heating appliances**, promoting its planned replacement.

- ✓ **Awareness:** raising consumers' interest in the heating topic
Consumer Theory of Change Model, key issues and communication channels
- ✓ **Quantification:** labelling the existing heating system
Methodology to calculate the efficiency and class of space, water and combi existing heaters
- ✓ **Overview of solutions:** presenting the most efficient heating technologies on the market
Assessment of heating solutions with the heating industry
- ✓ **Analysis of benefits:** providing information on potential energy, money and CO₂ savings
Estimate potential savings, new energy class and added co-benefits upon the replacement
- ✓ **Motivate the replacement:** extending the information to professionals and incentives
List of professionals that can support the consumer and available incentives

HARP'S ACTIVITIES

- Definition of the **consumer behaviour change model** regarding the adoption of heating systems
- Analysis of the heating stock in European households and current **market offer of heating solutions**
- Evaluation of the **co-benefits** associated with Energy efficient heating solutions
- Labelling methodologies** for the classification of existing heating appliances: space, water and combi heaters
- HARPa, **online application** (consumers and professionals)
- Materials toolbox** about energy efficient heating solutions for consumers and professionals
- Two heating season communication campaigns **Feb/May 21 and Oct21/April 22**
- Policy Integration scenarios** for the energy labelling of existing heating appliances in the EU and MS context

CONSUMER BEHAVIOUR CHANGE MODEL



HEATING STOCK IN EUROPEAN HOUSEHOLDS

What are the most common heating solutions installed at EU level?

In Europe there are over 160 million space and combi heaters installed and 93 million water heaters.

SPACE & COMBI HEATING

The most common heating technology in Europe is the gas boiler.

- The most commonly installed technology in Europe is the **gas boiler**, installed in approx. **57%** of the dwellings. The same pattern is observed in France, Germany, Italy and Spain. In Portugal the main solution are electric heaters.

Only 9% of the European dwellings are heated with renewable heat.

- The most common renewable solution is the **heat pump** technology (**5%**), followed by biomass boilers (**3%**) and solar thermal combi systems (**1%**).

Over 50% of the European dwellings are heated with low efficient technologies

- Non-condensing **gas and oil boilers**, **coal boilers** and **electric heaters** are examples for low efficient technologies.

WATER HEATING IN NUMBERS

70% of water heating appliances are electrical water heaters,
61% electrical storage water heaters,
9% electrical instantaneous water heaters.

18,5% of water heating solutions are gas instantaneous water heaters,
7% are solar thermal solutions.

15 years is the average age of dedicated water heaters.

ENERGY EFFICIENT SOLUTIONS ON THE MARKET

In depth **characterization of the solutions available on the market** in terms of technical characteristics and average selling price in the different countries.

Its the **basis for the calculation of potential energy, economic and emissions savings** having as baseline the existing heating solution.

Biomass boiler

Condensing boiler

Heat pumps

Hybrid heating system

Solar Thermal



CO-BENEFITS OF ENERGY EFFICIENT HEATING SOLUTIONS

- ✓ Reduction of environmental impact
- ✓ Real estate added value
- ✓ Improved air quality
- ✓ Thermal Comfort
- ✓ Independence from energy prices
- ✓ Improved aesthetics
- ✓ Ease of use
- ✓ Gain of useful area

To EU consumers some co-benefits are more relevant than others

The most relevant co-benefits are: thermal comfort, air quality and reduced environmental impact.

Different countries, different co-benefits

The co-benefits chosen depend on the context. In France, the most relevant co-benefit is the increase in the added value of the building, while in Spain thermal comfort and the independence from energy prices are the most valued.

Consumers are willing to invest in co-benefits

The reduction of environmental impact and independence from energy prices are the most valued co-benefits in terms of monetary value. In opposition, aesthetics was the one less likely to invest.

LABELLING METHODOLOGIES FOR EXISTING HEATING APPLIANCES (1/3)

- 1) **Harmonized methodologies** with the EU energy labelling regulations Reg. 811/2013 (space heating) and Reg. 812/2013 (water heating)
- 2) Introduction of a **degradation factor** according to the appliance's age defined in cooperation with the heating industry and considering the existence of regular maintenance procedures
- 3) Considered the **existing compulsory and voluntary** heating labelling schemes in EU countries
- 4) For validation, the methodologies considered the **technical data** of more than 5.000 appliances and also **laboratory testing** of water heaters
- 5) Definition of **standard values**, in accordance with EU norms (EN 15316), to use when not all the technical information is available to characterize the heating appliance.

HARPA ONLINE APPLICATION

HARPa, an online application supports consumers (and professionals) in the identification of their current heater’s energy class and finding an energy efficient replacement solution.

Furthermore it straitens the contact with professionals and identifies incentives available at national level.

Available at <https://heating-retrofit.eu/>



HARPA ONLINE APPLICATION

Efficient Heating System
Online-check

Start 2 Existing combi heating system 3 Your building 4 Requirements Finished

In order to tailor this app to your situation, we need to start with a few general questions.

What would you like to calculate?
Please choose your heating system

In which country is the building located?
Please choose one country

Climate zone
Please choose

- colder
- average
- warmer



What describes best your role? I am a ...
End User Heating Professional

Let's start!

Country and existing solution

Existing Heating System
Calculate Energy Label

Start 2 Existing space heating system 3 Your building 4 Requirements Finished

Previous

Please tell us a little about your existing heating system.

System type
Boiler

Energy source used by your installed heating appliance
Please choose

Age of heating system (installation year)
Please choose

Maintenance
Has the heating system been professionally maintained in the last 5 years?
Yes No

Optional field(s) below: Leave empty if you are not sure.
The values missing will be filled with default values

Nominal power (in kilowatt, kW)

Calculate Label

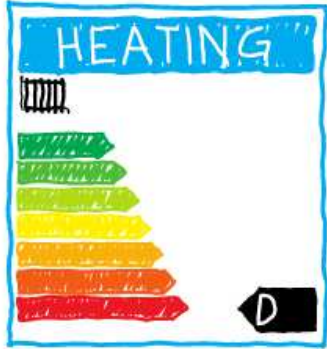
Characteristics of the existing solution

Existing Heating System
Calculate Energy Label

Start 2 Existing space heating system 3 Your building 4 Requirements Finished

Previous

Your existing boiler has an estimated efficiency of 37%, reaching an energylabel class of D.



Calculate Your Options

Label for the existing solution

HARPA ONLINE APPLICATION

Intended use

Estimate Your Energy Demand

Start Existing space heating system Your building Requirements Finished

Previous

Now, we need some information about the building.

Type of Buildings

Building Construction

Heating area (in m²)

Part-time usage? Is the building used only for a part of the year?
 Yes No, the building is used throughout the year.

Next questions

This heating check tool was developed within the HARP project, which received funding from the European Union. Contact details

Heating needs

Intended use

Some technical requirements

Start Existing space heating system Your building Requirements Finished

Previous

In order to recommend certain heating options, we need to ask a few last questions.

Storage space available?
 Is a minimum of 1.5 m³ available (1 m² x 1.5 m height)?
 Yes No

Roof/Garden available?
 Is at least 0 m² available?
 Yes No

Large Garden/Land available?
 Is at least 40 m² available?
 Yes No

Gas network
 Is the house connected to the gas grid?
 Yes No

Electric capacity sufficient?
 Yes No

Show Results

Characteristics of the house

Efficient Heating System

Possible Heating Solutions

Start Existing space heating system Your building Requirements Finished

Previous

Please find below the results for different technologies and your situation. These are indicative average values. For more details check the detailed information.

Best Energy Bill Savings

Technology	Energy	Energy bill savings
Solar thermal + Heat pump, air/water	Solar, Electricity	2,460 €/year

Best Energy Savings

Technology	Energy	Energy savings
Solar thermal + Heat pump, air/water	Solar, Electricity	36,200 kWh/year

Best CO₂ Savings

Technology	Energy	CO ₂ savings
Biomass boiler	Biomass	10.9 t/year
Solar thermal + Biomass boiler	Solar, Biomass	10.9 t/year

Additional benefits

The replacement of old and inefficient heating appliances allows the consumer to benefit not only in terms of energy and money savings but also from additional benefits such as reduction of environmental footprint, reduction of fossil fuels dependence, real state valuation of the house, improved air quality, etc. To know more about these benefits and consider these in the replacement decision process check the information materials available on the HARP project's website.

Full table

Heating solutions

HARP'S TOOLBOXES, FOR PROFESSIONALS AND CONSUMERS

CONSUMERS

- Brochure
- Heating technologies factsheets
- Videos
- Serious Games
- Infographics
- Articles
- Power point presentation
- Social media campaign

Solar heat
Heat my home and prepare domestic water with solar thermal

If your heating system is older than 20 years, it might be inefficient and highly energy consuming. Replacing your heating system with a more efficient will help you reduce your energy bill and additionally keep your home more comfortable, improve air quality, increase your home's market value and contribute to reducing global CO₂ emissions.

80% of the heating appliances installed in the EU are old and inefficient (energy class C or lower)

2.5 m³ of solar water heater installed saves up to 170kg of greenhouse gases (CO₂ equivalent) for the average person per year

The energy consumption for space and/or water heating can be reduced from 50% to 80%

A package using solar thermal for water heating reaches an efficiency of 90% (using energy use 10%), meaning they produce more useful energy than they consume.

✓ CHECKLIST

Solar thermal fits my home because

- ✓ I need a water and/or space heating system
- ✓ I want to reduce my energy bill by using renewable energy sources
- ✓ I am open to combine solar thermal with an additional energy source (electricity or thermal)
- ✓ I have suitable space (e.g. on the roof) for the installation
- ✓ Improving air quality is important to me
- ✓ I want to reduce my environmental footprint

HOW DOES SOLAR THERMAL WORK?

Solar thermal technology (commonly used) is heat, which is then used to heat water. Heat is used to heat buildings. The solar collectors are usually installed on the house roof, though they can be also integrated into building elements (e.g. balconies, façades) or on other building structures. Heat that solar collectors reach is transferred to an energy storage tank and a backup heater, for example a condensing boiler or a heat pump, which covers when the heat demand is too high for the solar system alone. These packages also prevent an energy bill with an energy class above A in a C or worse class. On average, in a single-family house, 50 to 90% of the heat required for space heating and/or domestic hot water can be generated with solar thermal energy.

Photo: Solar Thermal Energy

can be easily adapted to the needs and spaces of every house. Condensed storage tanks are often installed to store heat for hot water and space heating.

! DID YOU KNOW?

Aerothermal heat pumps make good use of the heat drawn from the air but are more sensitive to variations in the outside temperature, differently from geothermal heat pumps that benefit from the ground's stable temperature all year round.

Heat Pump
Heat my home and water with the heat pump

Inefficient and highly energy consuming. Replacing your heating to reduce your energy bill and additionally keep your home more in a market value and contribute to reducing global CO₂ emissions.

✓ CHECKLIST

Heat pump fits my home because

- ✓ I need a water and/or space heating system
- ✓ I want to reduce my energy bill by using energy that can be extracted from the ambient air, water or ground
- ✓ I want to install the most efficient technology
- ✓ I have access to a stable electricity network
- ✓ I have space for the installation
- ✓ Improving air quality is important to me
- ✓ A system with the cooling function would be a great option for my house
- ✓ I want to reduce my environmental footprint
- ✓ I want to increase my house value

Photo: Deco

Torne-se um Mestre em Aquecimento!

Quiz: "O que sabe sobre aquecimento"

Jogo da memória.

Aqueça a sua memória!



HARP: as tecnologias de aquecimento doméstico...
pt.linkedin.com



HARP: Porque é tão importante os consumidores...
deco.pt

Solar thermal

10

Boiler

30

Heat pump

Gas boiler

Hybrid system

HEATING BENEFITS – BEYOND THE ECONOMICS

What are the most important benefits when you think about replacing your heating appliance? Know more about everything you can get from an energy efficient heating solution for your home.

Energy Efficient Heating Appliance

Direct benefits

- Energy savings
- CO₂ reduction
- Money savings

Co-benefits

- Thermal comfort
- Added value of property and much more...

CO-BENEFITS

- Reduction of environmental impact - improved environmental performance regarding energy and associated carbon emissions.
- Real estate added value - improvement of the market value of the property after implementation of the heating solution.
- Improved air quality - less harmful gases, particulates and microbial contaminants which can harm occupant's health.
- Thermal Comfort - improved thermal comfort regarding adequate room temperatures and relative humidity.
- Independence from energy prices - reduced exposure to energy price fluctuations.
- Improved aesthetics - less visual impact on the exterior of the building after the heating system is installed.
- Eases of use - user friendly maintenance and control of the heating solution.
- Gain of useful area - less needs of space for the heating system installation, including storage.

In EU countries most co-benefits are more relevant than others.

Thermal comfort - The most relevant co-benefits are: thermal comfort, air quality and reduced environmental impact.

Real estate added value - The co-benefits chosen depend on the context. In France, the most relevant co-benefit is the increase in the added value of the building, while in Spain heating comfort and the independence from energy prices are the most valued.

Independence from energy prices - The reactions of environmental impact and independence from energy prices are the most valued co-benefits in terms of monetary value. In opposition, aesthetics will be the less easy to invest.

The European Council for Energy Efficient Buildings (ECEB) is a leading organization in the field of energy efficiency in buildings.

Wellcome Group

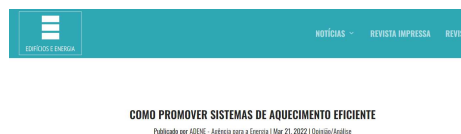
www.wellcomegroup.com

deco.pt

HARP'S TOOLBOX, FOR PROFESSIONALS AND CONSUMERS

PROFESSIONALS

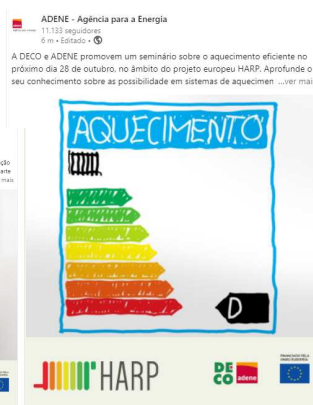
- Brochure
- HARPa tutorial
- Articles
- Power point presentation
- Online trainings
- Social media campaign



Um estudo recente da Associação Europeia de Aquecimento, EHI, realizado a três mil consumidores europeus que haviam recentemente adquirido um novo sistema de aquecimento concluiu que mais de 70 % dos inquiridos adquirem o mesmo tipo de tecnologia que já possuíam, 43 % acreditam que as características das suas casas não lhes permitem um sistema diferente, 28 % não conhecem outras tecnologias e 25 % não tiveram tempo ou disponibilidade para procurar mais informação.

Do total dos inquiridos que haviam adquirido um novo sistema para substituir um pré-existente, 2/3 indicaram tratar-se de uma substituição de emergência por o sistema anterior ter avariado e 1/3 indicaram que, apesar de o sistema antigo ainda funcionar, decidiram adquirir um novo que lhes permitisse reduzir a sua fatura energética, ter um sistema mais eficiente e/ou reduzir as emissões poluentes associadas.

De facto, o cenário que o estudo indica não é novo na medida em que a decisão de substituição de um sistema de aquecimento é normalmente uma decisão de emergência e ocorre quando o sistema antigo avaria e a pessoa está com frio, sem água quente e só quer que alguém instale algo que funcione, preferencialmente igual à solução que tinha anteriormente e que já conhece. O papel do profissional, seja este um instalador especializado em aquecimento ou perito qualificado, é essencial para que o consumidor saia do seu estado de confusão e, através de uma avaliação adequada do equipamento antigo, identifique



Recursos para profissionais

A aplicação online HARPa oferece uma versão avançada para profissionais, que permite quantificar com maior detalhe a eficiência dos equipamentos instalados e apoiar na identificação e quantificação das poupanças associadas às soluções mais eficientes disponíveis no mercado. A sua utilização é gratuita, bem como a utilização dos resultados da simulação e respetivo relatório.

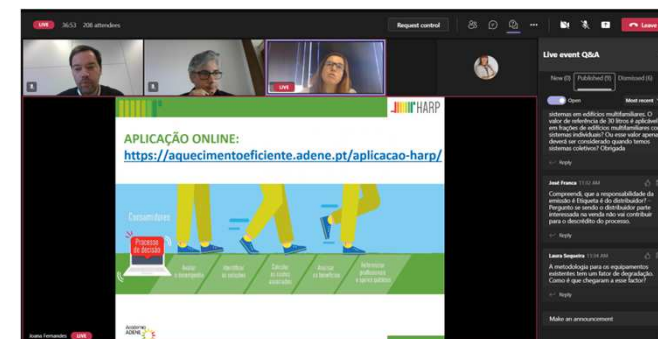
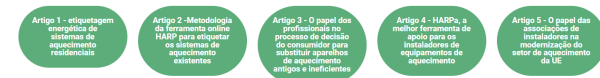
A simulação da etiqueta energética do sistema de aquecimento existente pode ser um bom suporte para os profissionais de instalação e manutenção destes sistemas. Desta forma podem apresentar aos seus clientes, de forma mais atrativa e com a inclusão do relatório de simulação em propostas comerciais, as oportunidades de melhoria dos seus sistemas de aquecimento, motivando o consumidor a mudar para um sistema mais eficiente.



Conheça a ferramenta HARPa através deste pequeno vídeo tutorial onde explicaremos todo o percurso que o profissional realizará para utilizar a ferramenta do HARPa.



Descarregue os artigos para profissionais e saiba mais sobre o aquecimento eficiente.



HARP'S TWO HEATING SEASON CAMPAIGNS

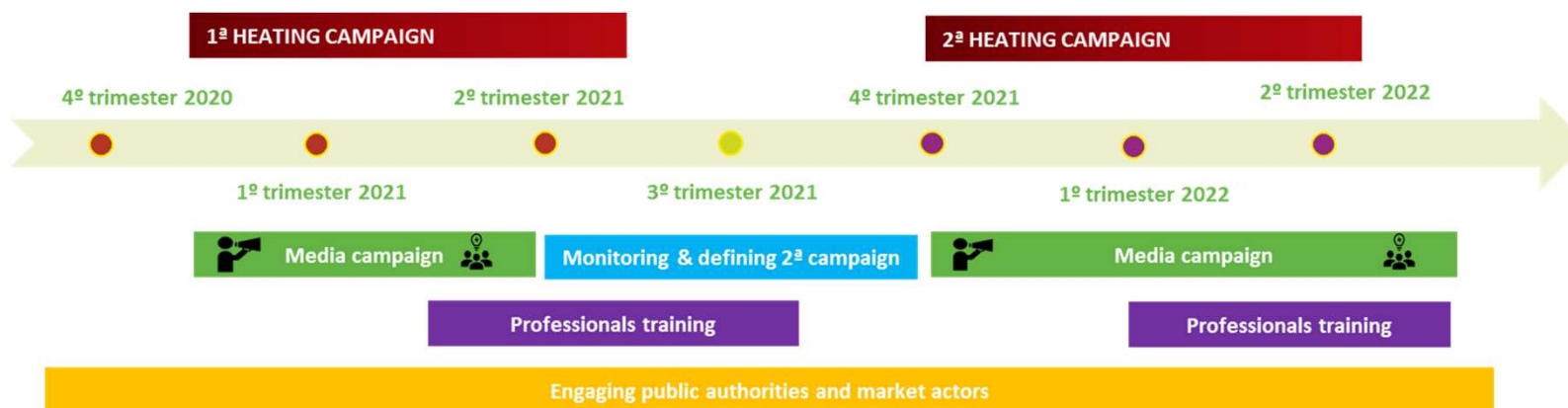
Two heating seasons campaigns in 5 countries: 2020/2021 and 2021/2022

Consumers

- Social media campaign
- Public media
- Communication from National authorities, consumer organizations and industry

Professionals

- Trainings
- Communication in specialized media and events



HARP'S RESULTS

8,9 m consumers reached
(KPI = 1,5 m)

**34.367 Energy labels
issued for existing heating
systems**

**17.681 simulations for
more energy efficient
solutions**

**18.979 consumers
motivated to change**
(KPI=10.000)

**134.355 professionals
reached**

**1.037 professionals
trained**
(KPI = 1.000)

6 PROPOSALS FOR POLICY INTEGRATION SCENARIOS

Harmonize the existing systems for the energy labelling of existing heating appliances (voluntary and compulsory)

Take the opportunity to make these systems compatible with the EU regulations and considering both space and water heating

Reinforce the link to EPREL – European product database

Allowing for the comparison between the efficiency of old and new heating appliances

Maintenance procedures of heating appliances

providing more information on the energy performance and class of the existing appliance

Reinforce the link to EPBD

harmonizing the heating appliances performance evaluation with labelling regulations

One-stop-shops/renovation passports

support the consumer in the adoption of energy efficiency measures in their house, namely addressing the heating system

Prioritize energy efficiency incentives and support the energy transition

boosting the replacement of the oldest and most inefficient heating appliances, targeting those more in need and achieving the highest revenues in terms of energy savings

Thank you for your attention!



Rui Fragoso

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