

# The replace project

Making heating and cooling for European consumers efficient, economically resilient, clean and climate-friendly



[replace-project.eu](https://replace-project.eu)

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*Disclaimer: The views expressed in this presentation are the sole responsibility of the author and do not necessarily reflect the views of the REPLACE consortium*



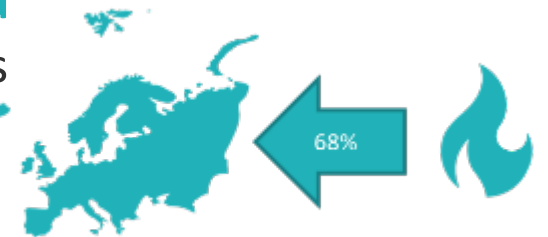
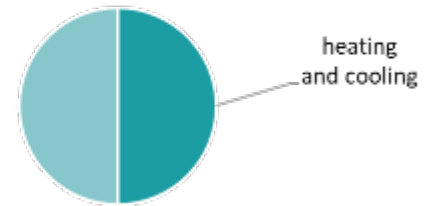
This project has received funding from the European Union's Horizon 2020 Research and innovation programme under grant agreement No 847087.



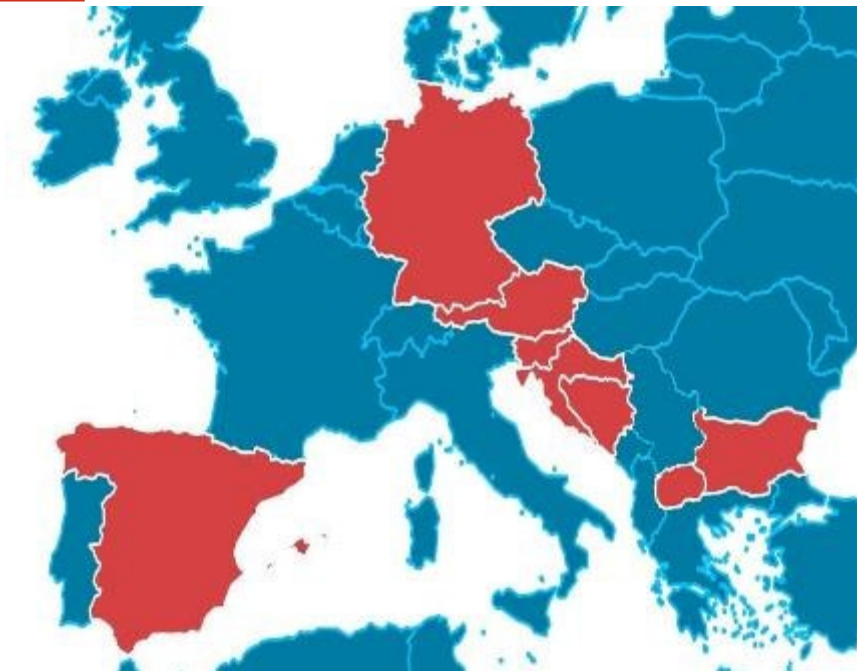
# Situation on the European space heating market

- Heating and cooling sector (HC)
  - causes 50% of the European final energy consumption,
  - is responsible for over 68% of all natural gas imports.
  - 80 million out of 120 million installed space heating systems in Europe only achieve C or D label class.
- **replace** aims to **boost the phase-out of inefficient and old heating systems** by targeting consumers, investors & owners as well as intermediaries and **helps them to make informed decisions.**

European final energy consumption



# The **replace** project - 11 partners in 8 countries, with different market development and socio-economic conditions



## Our Objectives

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- Space and tap water **heating** in **residential households** shall become **independent from energy imports**
- Green **heat shall come from close to home**, cleanly and efficiently from one's own roof, garden, soil or local forest



## The Challenge & Our Solution

- **Households** need **easy access** to product-neutral **know-how** to **take informed decisions** to quickly **end dependency** by local energy sources
- **replace supports informed decision making** by providing information about **sustainable solutions**, **tools** to find the most suited one, and **best practice examples** to learn from



...and what do we offer?

How does **replace** address the current energy crises, concretely?



# Horvat family quickly wants replace its fossil fuelled heater, because it's **too expensive** and **supply is highly unsecure**



„Oh dear, we can afford less and less from our family income, especially heating with natural gas is really worrying us!“

4 Horvat family is **really worried** because of recent developments



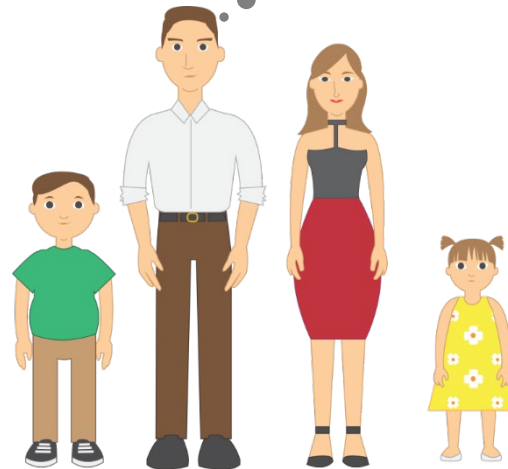
„It is really clear now that oil and gas are no future-proof options and we want to preserve a liveable environment for our children. But what climate-friendly alternative system is the right choice for us?“

4 Horvat family **needs reliable info** on suitable clean alternatives



„How much would we have to spend and can we afford that? Where can we get financial help?“

4 Horvat family needs info on **financial viability** and any **financial support** available

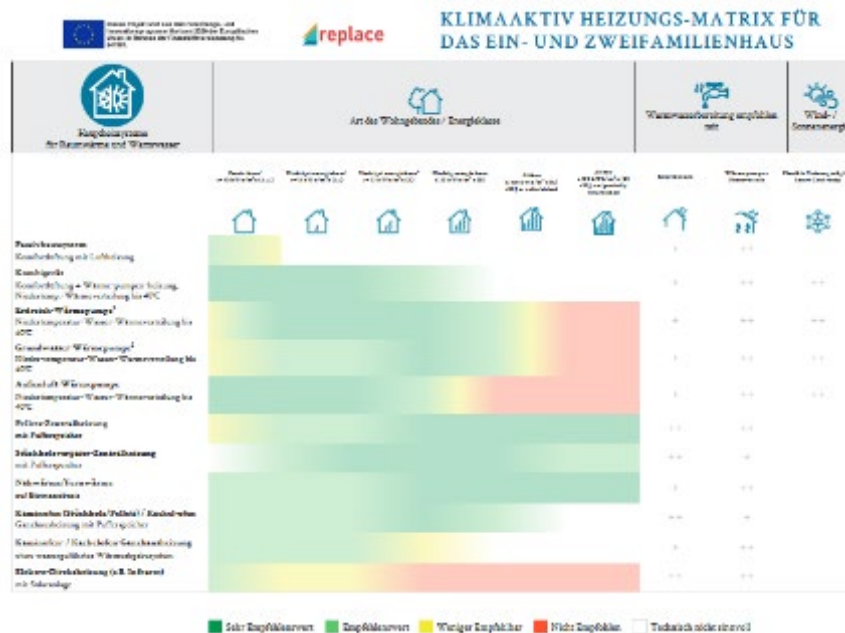


Have your independent  
**replace**ment advice



# replace approach to support informed decision making

- Interactive online Heating matrices
- Answers which climate-friendly heating system(s) fit(s) best to your house
- [replace-project.eu/replace-heating-matrix](https://replace-project.eu/replace-heating-matrix)



A **renewable energy based heating system** – be it an oven, an in-house boiler or a connection to district heat – not only brings a **clean, liveable environment** but **cost savings, comfort and cosiness**.

**On top** it delivers **independence and supply security**.

All that is made **possible with energy from your region**: whether being it **solar** energy, **biomass** or **ambient heat** (made available with renewable electricity) via a **heat pump** or a **connection to** (soon) **renewable district heat** network



## replace Tools -

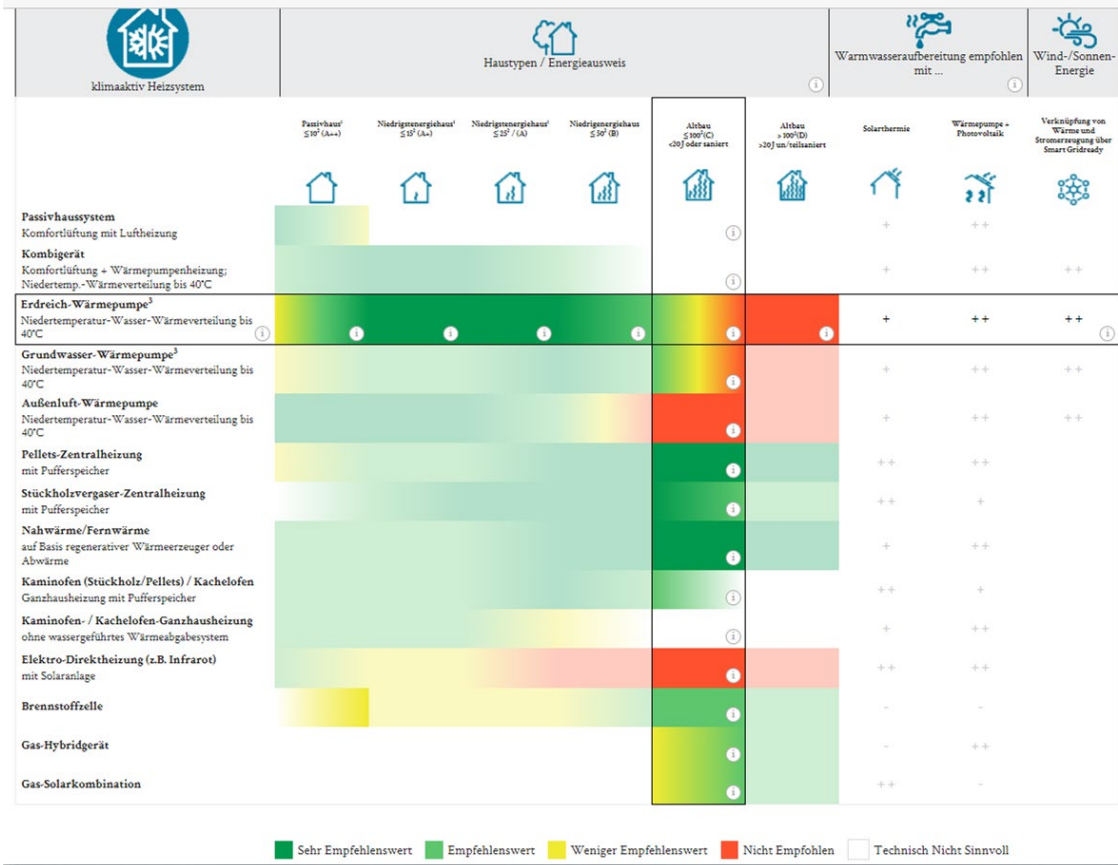
### Interactive online Heating matrices (II)

In the Heating Matrices the **climate-friendly heating systems** are classified in a **traffic light system**. Gradation is based on a criteria, like energy efficiency, heating comfort, investment and CO<sub>2</sub> emissions.

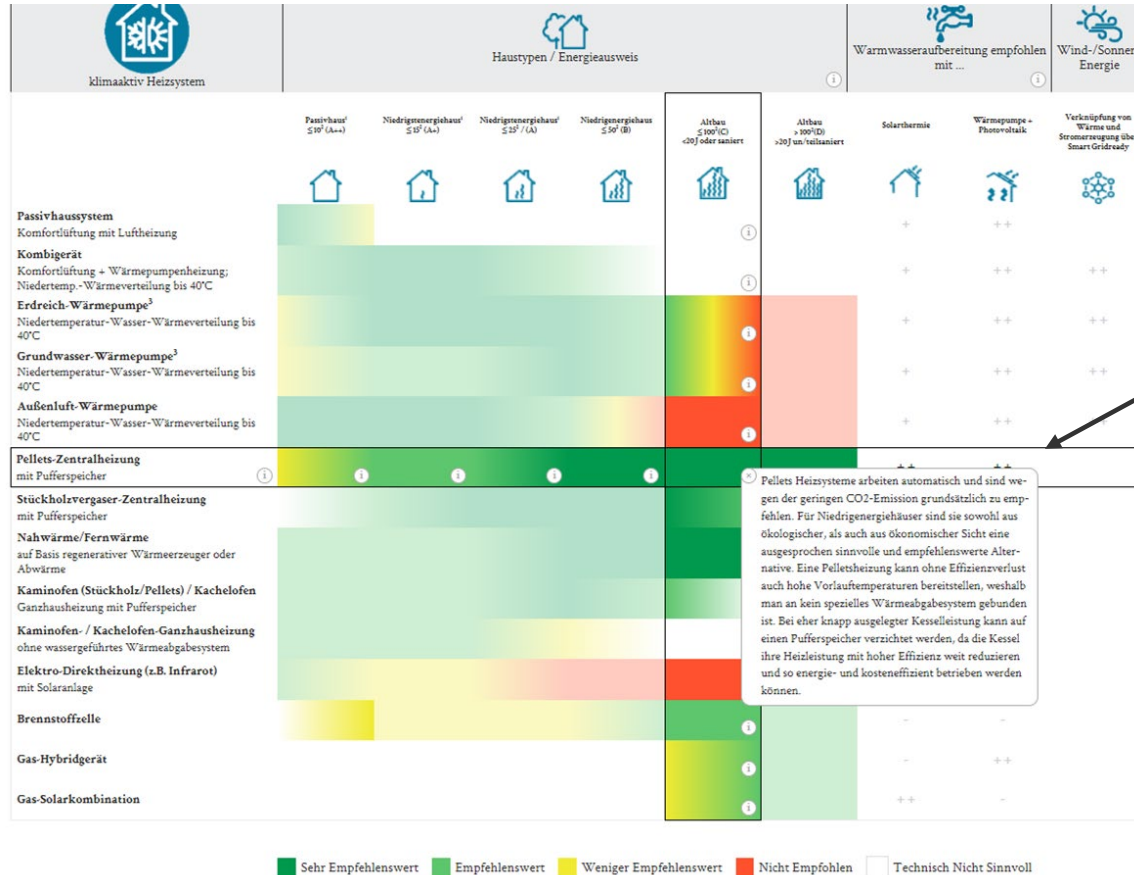
Clean heating systems with **dark green fields** support **high energy efficiency**, **very low CO<sub>2</sub> emissions**, **low investment** and **high heating comfort**. Heating systems with **yellow fields** are only **conditionally recommended**, and those with **red fields** are **not recommended** – due to inefficiency or criteria non-compliance.



# replace Tools - Interactive online Heating matrices (III)



# replace Tools - Interactive online Heating matrices (IV)



Mouse-over info explains what users should look out for when choosing a certain heating system or why exactly a system is recommended or not recommended.

Pellets Heizsysteme arbeiten automatisch und sind wegen der geringen CO<sub>2</sub>-Emission grundsätzlich zu empfehlen. Für Niedrigenergiehäuser sind sie sowohl aus ökologischer, als auch aus ökonomischer Sicht eine ausgesprochen sinnvolle und empfehlenswerte Alternative. Eine Pelletsheizung kann ohne Effizienzverlust auch hohe Vorlauftemperaturen bereitstellen, weshalb man an kein spezielles Wärmeabgabesystem gebunden ist. Bei eher knapp ausgelegter Kesselleistung kann auf einen Pufferspeicher verzichtet werden, da die Kessel ihre Heizleistung mit hoher Effizienz weit reduzieren und so energie- und kosteneffizient betrieben werden können.

# Quick Check

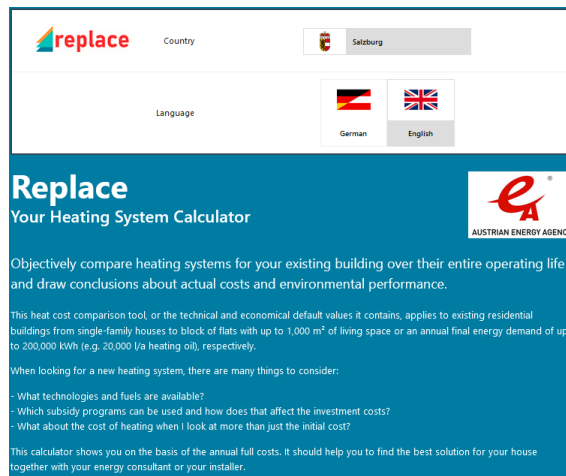
## economic **replace**ment

### viability

(including any financial support)

# replace approach to support informed decision making

- **Replace** Your Heating System **Calculator**
- Supports an **easy do-it-yourself energy advice** (free of charge)
- [energieinstitut.at/tools/Replace](https://energieinstitut.at/tools/Replace)



replace Country Salzburg

Language German English

## Replace Your Heating System Calculator

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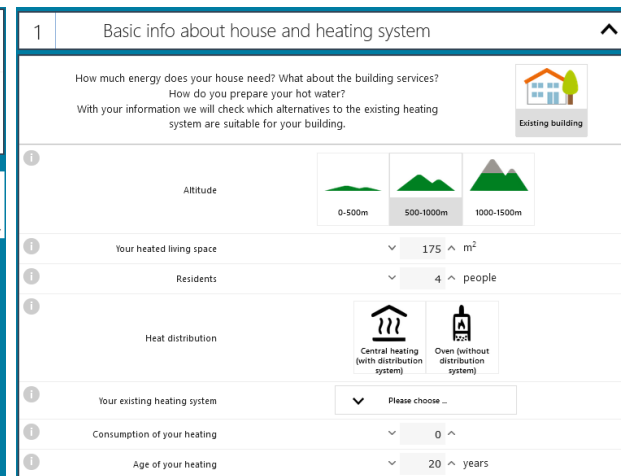
Objectively compare heating systems for your existing building over their entire operating life and draw conclusions about actual costs and environmental performance.

This heat cost comparison tool, or the technical and economical default values it contains, applies to existing residential buildings from single-family houses to block of flats with up to 1,000 m<sup>2</sup> of living space or an annual final energy demand of up to 200,000 kWh (e.g. 20,000 l/a heating oil), respectively.

When looking for a new heating system, there are many things to consider:

- What technologies and fuels are available?
- Which subsidy programs can be used and how does that affect the investment costs?
- What about the cost of heating when I look at more than just the initial cost?

This calculator shows you on the basis of the annual full costs. It should help you to find the best solution for your house together with your energy consultant or your installer.



1 Basic info about house and heating system

How much energy does your house need? What about the building services?  
How do you prepare your hot water?  
With your information we will check which alternatives to the existing heating system are suitable for your building.

Existing building

Altitude: 0-500m, 500-1000m, 1000-1500m

Your heated living space: 175 m<sup>2</sup>

Residents: 4 people

Heat distribution: Central heating (with distribution system), Oven (without distribution system)

Your existing heating system: Please choose ...

Consumption of your heating: 0

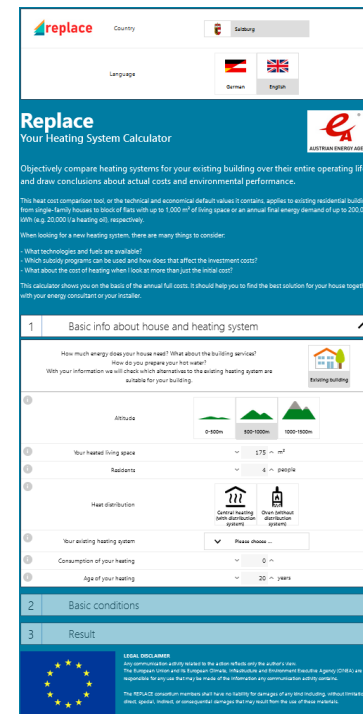
Age of your heating: 20 years



# The Replace Your Heating System Calculator

## Scope

- Giving **orientation and enable informed decisions** in the **residential heating sector** (consumers, investors, owners etc.)
  - **Replacement of an existing, old**
    - fuel oil, natural gas,
    - electric, coal or log-wood
    - **heating system** (boiler or ovens; depending on region)
- by **new, clean and climate-friendly** solutions.





# The Replace Your Heating System Calculator

## Features

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- Based on the Austrian klimaaktiv [Hexit calculator](#) (of the Ministry for Climate Action).
- The **calculator is tailored** to the situation
  - in **8 European pilot regions** (AT, BiH, DE, BG, ES, HR, MK, SL) and
- **works in 8 languages** (incl. EN for every region)
- features **technical and economical default values**
  - applying to heating system renovations in residential buildings,
  - ranging from single-family houses to
  - block of flats with up to 20,000 l/a heating oil equivalent (i.e. 20 MWh/a).



# The Replace Your Heating System Calculator

## Scope

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- Regarding a new heating system, **many things to consider**:
  - What **technologies and fuels are available**?
  - Which **subsidy programs** can be considered, how does that affect costs?
  - What about the **cost of heating** when I look at **more than just the initial costs**?
- **replace** calculator gives **answers based on annual “full” heating costs**:
  - **Not just fuel cost comparison**, investment and subsidies are considered too
- Enables you to **find the best solution for your house**
  - Ideally, together with your energy consultant or your installer.



# “Quick mode” - You need no previous knowledge

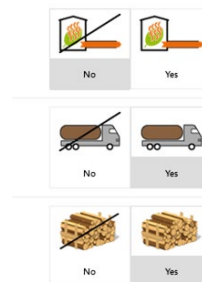
## In just 3 steps - by easily defining

### Step 1: Basic Info

- the **actual energy consumption** of the heated building
- the **type** of existing **heat distribution/emitter** and of hot water preparation system

### Step 2: “Fuel” options

- possible **connection** to a local or **district heating** network
- **accessibility** with a **wood pellets** lorry
- availability of a solid **biomass fuel storage** room



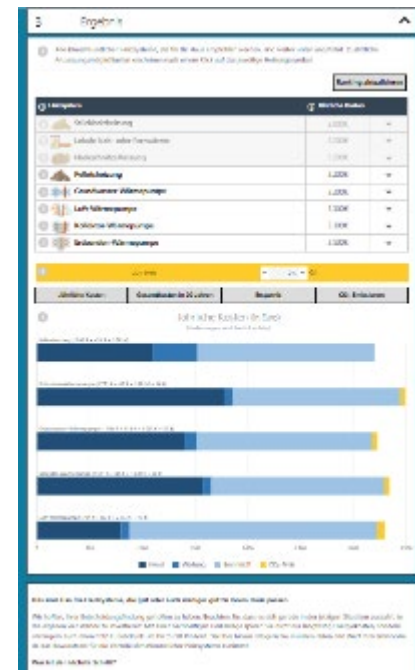
### Step 3: Results, i.e. techno-economical comparison of **viable green alternatives**



# The Replace Your Heating System Calculator

## Results

- Comparison of **annual heating costs**, i.e. yearly costs for
  - **Investment** (reduced for any subsidies & averaged)
  - **Fuel**, CO<sub>2</sub> price
  - **Service & Maintenance**
- Compared to existing heating system, **annual**
  - **cost savings**
  - **t CO<sub>2</sub> avoided**



“Expert mode” or

If you want to **compare economics of installers’ offers, etc.**

Further adjustments possible

Heating system Yearly costs

|                                  |        |   |
|----------------------------------|--------|---|
| 1 Log wood boiler                | 1.900€ | ▼ |
| 2 District or local heating grid | 2.800€ | ▼ |
| 3 Pellets boiler                 | 2.900€ | ▲ |

**Investment costs** (Subsid. included): 9700 Euro  
**Annual CO<sub>2</sub> reduction**: 7,3 tons  
**Annual cost savings**: 1400 Euro  
**Comfort improvement**

**Necessary storage space:**  
Necessary space for pellets (when stored in a pellets bunker) = 5,8 m<sup>3</sup>, gross  
Necessary filling volume for pellets (when stored in a fabric tank system) = 3,5 tons.

**Further adjustments**

- Technologie-Datenblatt.pdf
- Verfügbare Anreize für meine Region.pdf
- Nützliche Kontakte.pdf
- Best-Practice-Beispiel Ölkesselsatz durch Pelletskessel.pdf
- Best-Practice-Beispiel Kombiniertes Pellets- und Stückholzkessel in Einfamilienhaus.pdf
- Best-Practice-Beispiel Biomasse-Mikronetz in ländlicher Siedlung.pdf
- Best-Practice-Beispiel Nutzung von mobilen Heizgeräten mit Anwendungsfall (Hotel in Anif, Salzburg).pdf
- Best-Practice-Beispiele für Pelletskessel.pdf
- Planungshilfe.pdf
- Ist Biomasse nachhaltig.pdf

**Fact-Box Pellets boiler**

The pellet heating system combines the advantages of wood heating with the convenience of an automatic system, with the comfort of an automatic system. Space for a pellet store is available instead of the oil tanks. Pellets are a standardised fuel that can ideally be stored as a year's supply.

Advantages: low fuel costs; renewable energy source; fits any building;  
Disadvantages: higher investment costs; higher maintenance costs;



“Expert mode” or

If you want to **compare economics of installers’ offers, etc.**



Manually updates  
of investment,  
subsidies, fuel  
prices, other costs  
possible

| Heating system                 |  | Yearly costs |   |
|--------------------------------|--|--------------|---|
| Log wood boiler                |  | 1.900€       | ▼ |
| District or local heating grid |  | 2.800€       | ▼ |
| Pellets boiler                 |  | 2.900€       | ▲ |

**Investment costs** (Subsidies included): 7000 Euro  
**Annual CO<sub>2</sub> reduction**: 7.3 tons  
**Annual cost savings**: 1400 Euro  
**Comfort improvement**

**Further adjustments**

|                             |                      |
|-----------------------------|----------------------|
| Investment costs (€)        | Promotions (€)       |
| ▼ 20200 ▲                   | ▼ 10500 ▲            |
| Energy price OLD (cent/kWh) | Energy price NEW (€) |
| ▼ 132.9 ▲                   | ▼ 306 ▲              |

Energy price increase: 2% (green), 4% (yellow), 6% (red)

|                                |                                |
|--------------------------------|--------------------------------|
| Service costs per year OLD (€) | Service costs per year NEW (€) |
| ▼ 330 ▲                        | ▼ 537 ▲                        |

- Technologie-Datenblatt.pdf
- Verfügbare Anreize für meine Region.pdf
- Nützliche Kontakte.pdf
- Best-Practice-Beispiel: Ölkesselersatz durch Pelletskessel.pdf
- Best-Practice-Beispiel: Kombienerter Pellets- und Stückholzkessel in Einfamilienhaus.pdf
- Best-Practice-Beispiel: Biomasse-Mikronetz in ländlicher Siedlung.pdf
- Best-Practice-Beispiel: Nutzung von mobilen Heizgeräten mit Anwendungsfall Hotel in Anif, Salzburg.pdf
- Best-Practice-Beispiele für Pelletskessel.pdf
- Planungshilfe.pdf
- Ht\_Biomasse\_nachhaltig.pdf



...more information needed?

# Handbooks for heating system replacements



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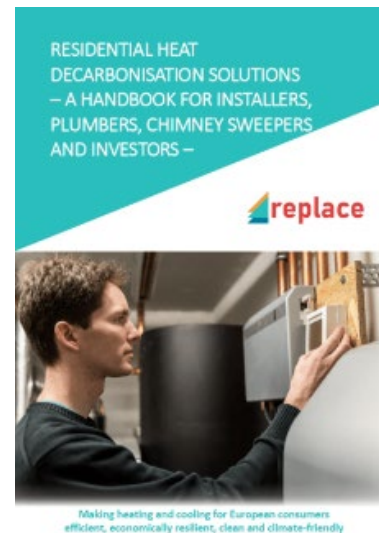
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## Product-neutral information to enable informed decisions

### Handbooks for Heating System Replacements

- for end consumers
- for professionals & investors
- [replace-project.eu/technology-guides](https://replace-project.eu/technology-guides)





- **Objective:** to provide a **practical guide** to end-users who are considering **replacing their heating system** or **setting an energy efficiency measure** in their home.
- [replace-project.eu/technology-guides](https://replace-project.eu/technology-guides)



# replace Handbook for end consumers

## What's in it?

- **Useful information on the economic, environmental and social benefits** of replacing an old and inefficient heating system with an innovative low-carbon and renewable one
- **Advises on the steps that every informed consumer should take** before and during the replacement process
- **Answers the most common questions** that end-users ask in the replacement process
- **A comprehensive list of the renewable heating and cooling technologies currently available** on the European market through concise and illustrated **technology factsheets**.

RENEWABLE HEATING & COOLING  
REPLACEMENT TECHNOLOGY BRIEFS  
FOR END CONSUMERS



Making heating and cooling for European consumers  
efficient, economically resilient, clean and climate-friendly



# replace Handbook for end consumers

## RH&C technologies covered

- Biomass boilers for **wood pellets** and for **logwood**
- Biomass heating systems with **woodchips**
- Modern wood **stoves** and pellet stoves
- Electric **heat pumps**
- **Solar thermal**
- **Photovoltaic** power for heating
- Renewable mechanical (active) **cooling**
- Multifunctional **façade systems**
- **Other** heating options (i.e. collective actions, shading and insulation, infra-red heating systems, etc.)

**SOLAR THERMAL**

**Did you know?**  
While PV currently harnesses up to 20% of sun light, solar thermal plants harness about 40% per square meter. Although both mechanisms rely on the energy of the sun, solar thermal collectors and solar panels (photovoltaics) are used for different purposes. While PV are (traditionally) used to generate electricity from solar energy, solar water heating converts sunlight into heat. Consequently, we start use solar thermal for lighting, but we can use it to heat water or for space heating.

**How it works**  
A solar thermal system works by harnessing the sun's energy and converting it into heat which is then transferred into your heating system for hot water or space heating. Everyone knows what happens to the water inside a garden hose lying in the sun: after a while, the water gets hot. Solar collectors make use of this effect. Absorbers made of copper or aluminium capture the heat rays and transfer the heat to the water that flows through them. The absorbers are covered with glass, insulated on the back and tightly sealed with a jacket so that as little as possible of the valuable solar heat can escape back to the outside. From around 1,000 kWh of solar radiation per square metre and year, solar collectors get 200 kWh of hot water. This is collected in a solar storage tank and fed into the sanitary and heating installations in the house.

**Target group:** Building owners of individual and small buildings

**How it works (diagram):** The diagram shows a solar collector on the roof connected to a pump and controller, which circulates hot water to a buffer tank. From the buffer tank, the hot water is distributed to space heating and a hot water tap. Cold water returns from the space heating and hot water tap back to the buffer tank, which then returns it to the collector.

**Did you know?**  
s rays to heat a transfer fluid which is a mixture of water and glycol, to the winter. The heated water from the collectors is pumped to storage or radiator.  
to heat the water inside the **buffer tank**. The heat is then spread **radiators**. After the liquid releases its heat, the water will flow back to the collector which will ensure that the fluid will circulate to the collector when  
sating panels – flat plate and evacuated tubes (referring to the coated tubes look like a bank of glass tubes fitted to your roof, into the roof or integrated into it.  
han flat-plate versions, so they are often smaller but still used flat-plate collectors are often used for swimming pool  
etween solar heaters for domestic hot water production rating. A solar system for hot water in the kitchen and spa usually has 4 m<sup>2</sup> of solar collectors on the roof and tral Europe, the sun provides about 50 to 60 per cent vided by the heating system. A solar system for hot of at least 15 m<sup>3</sup> and a 1,000 litres water storage the transition months, i.e. it heats your house also u can replace 25 % or up to 50 % of the heating  
if system? The orientation of the roof surface -facing with a pitch between 20° and 60° are - between 20° and 32°) are an advantage in -) in winter. A solar heating system makes sense if -> greatest possible extent by the people living in the house.

**Did you know?**  
Technologies. More often, solar thermal systems can be used when it whenever it is required. Thermal energy storage energy supply and demand, but also increases the % of solar energy available, a thermal energy storage system they can work in combination with biomass

**Did you know?**  
You have paid for the initial purchase and installation of the system, you reduce your electricity consumption, for example by connecting the renewable heating system and can reduce your carbon dioxide you with about half to two-thirds of your annual hot water needs. maintenance and the costs of it are very low.

**Did you know?**  
If a person households once in the form of hot for water storage in the basement), and once for (Cost vary depending on the type of hot water heater). An indication from 327 €/kWh) U.S. space for storage.



...more information needed?

# Best practice examples of heating system replacements



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## Best practice examples of RH&C replacements

- Objective:
  - To provide a **catalogue of best practices** and innovative approaches for H&C replacement from **Western, to Central to South-Eastern Europe**.
  - To show how **replacements** can be implemented under **real local conditions**, being technically and economically **feasible** at the same time.
- [replace-project.eu/best-practice/](https://replace-project.eu/best-practice/)



# replace Best practice examples of RH&C replacements

## What's in it?

### Best practice examples:

- Residential building **refurbishment**
- Heating and cooling **replacement**
- Demand-response and **collective actions**
- **Innovative** approaches like utilising **mobile heating units** or innovative building renovations



# replace Best practice from Bosnia & Herzegovina



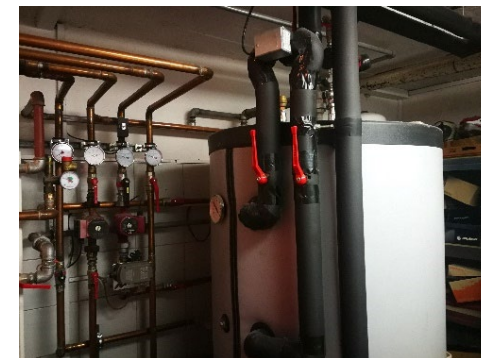
|  |  |
|--|--|
| <b>New heating system in use</b>                               | Pellet boiler with radiator installation |
| <b>Previous replaced heating system</b>                        | Coal boiler with radiator installation   |
| <b>Building type</b>   | Detached family house                    |
| <b>Installed capacity (kW<sub>th</sub>) – Before and after</b> | 35 kW → 40 kW                            |
| <b>Primary energy - Before and after</b>                       | 51,282.40 kWh → 40,650 kWh               |
| <b>Annual energy savings (compared to the previous system)</b> | 1.2%; 0.4 MWh                            |
| <b>Initial investment (purchase and installation)</b>          | 3,300 EUR                                |
| <b>Yearly CO<sub>2</sub> emission reductions</b>               | 9.93 t CO <sub>2</sub>                   |



# replace Best practice from Slovenia



|  |  |
|--|--|
| <b>New heating system in use</b>   | Heat pump<br>(air to water)                    |
| <b>Previous replaced heating system</b>  | Oil boiler                                     |
| <b>Building type</b>   | Single family house                            |
| <b>Heated floor area</b>   | 140 m <sup>2</sup>                             |
| <b>Installed capacity (kW<sub>th</sub>) – Before and after</b>                     | Before: 30 kW<br>After: 9 kW                   |
| <b>Energy carrier – before and after</b>   | Before: Fuel oil<br>After: Electricity         |
| <b>Energy use for heating – before and after</b>                                   | Before: 2.5 m <sup>3</sup><br>After: 6,500 kWh |
| <b>Initial investment (purchase and installation)</b>                              | 12,000 EUR                                     |
| <b>Yearly savings on the energy bill (compared to previous system)</b>             | 38 % in EUR                                    |
| <b>Yearly energy savings (compared to previous system)</b>                         | 37 % in MWh                                    |
| <b>Yearly CO<sub>2</sub> emission reductions (only heating system replacement)</b> | 45 %   |





# replace campaigns are carried out in nine different pilot regions

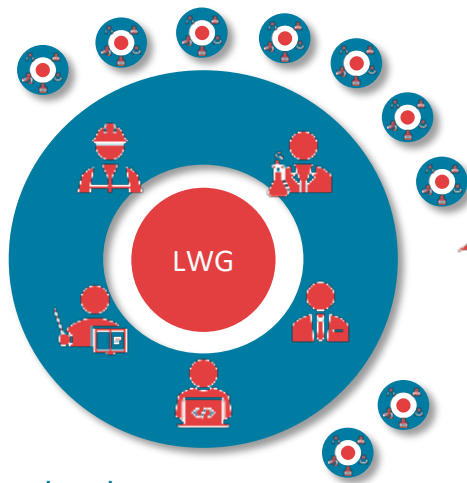


# replacement campaigns

## implemented by nine local working groups (LWG)

### LWG composition

- Regional authorities
- Policy makers
- Municipalities
- Energy advisers
- Installers
- Chimney sweepers
- Equipment manufacturers
- Equipment wholesalers
- ESCOs
- Local/regional managers
- Ministries in charge
- Funding bodies
- Energy agencies
- Etc.



local  
working  
groups



campaigns in  
pilot regions



Offer of different tailor-made „activity packages“  
addressing and reducing main barriers



## Activity 3 - Municipal information hubs



## Activity 4 & 5 – H/C replacements info at consumer fairs and festivals



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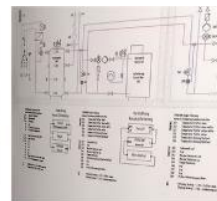
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## Activity 6 - 100 % renewable heated houses labelling campaign



## Activity 7 - Open cellar events



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## Activity 8 - Regional field trips to best practice RHC systems



## Activity 10 - Facilitating mobile emergency heating devices



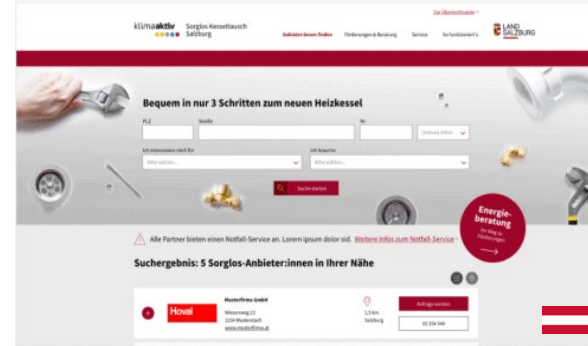
## Activity 12 & 13 - Facilitating collaboration of installers and contractors & Realisation of collective actions



## Activity 15 - All-round carefree packages for boiler replacement



- internet platform of the pilot initiative, to select a provider in the homes' vicinity
- provider **carries out heating checks** to save energy, **installs** climate-friendly heating system and **provides a mobile heating device** in the event of a heating system breakdown



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## replace – Highlight

### Increased volume of subsidies in Bulgaria

Project partner BSERC was directly involved in increasing the subsidy for renewable heating systems at the national level to 70 mio Euro.

BSERC is also organizing a joint purchase of pellets in two municipalities in the summer of 2022, which will also have a positive effect on the price.



## replace – Highlight



### A new subsidy scheme in Spain

The project partners made more knowledge about biomass directly available to end customers: 200 houses and 200 boilers are getting an information label.

10 info hubs have been established.

A new subsidy scheme developed by EREN is helping to switch a total of 10 MW of residential boiler capacity from fossil fuels to biomass within some months.





## replace – Highlights

### Fuel oil boilers decrease in Slovenia

Everyone who wants to apply for a subsidy for climate-friendly heating is automatically recommended to use the **replace Calculator**.

Campaign “**Replace fuel oil for the sake of the environment**” resulted in **replacement over 130 fuel oil boilers** with heat pumps.



**ZAMENJAJ OLJE  
ZA OKOLJE**



# Kick-off in November 2019 in Vienna



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# Contact

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## Herbert Tretter

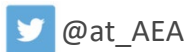
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### Further info:

[www.replace-project.eu](http://www.replace-project.eu)



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