



# FRONT – ESTIMATING RHC ENERGY COSTS

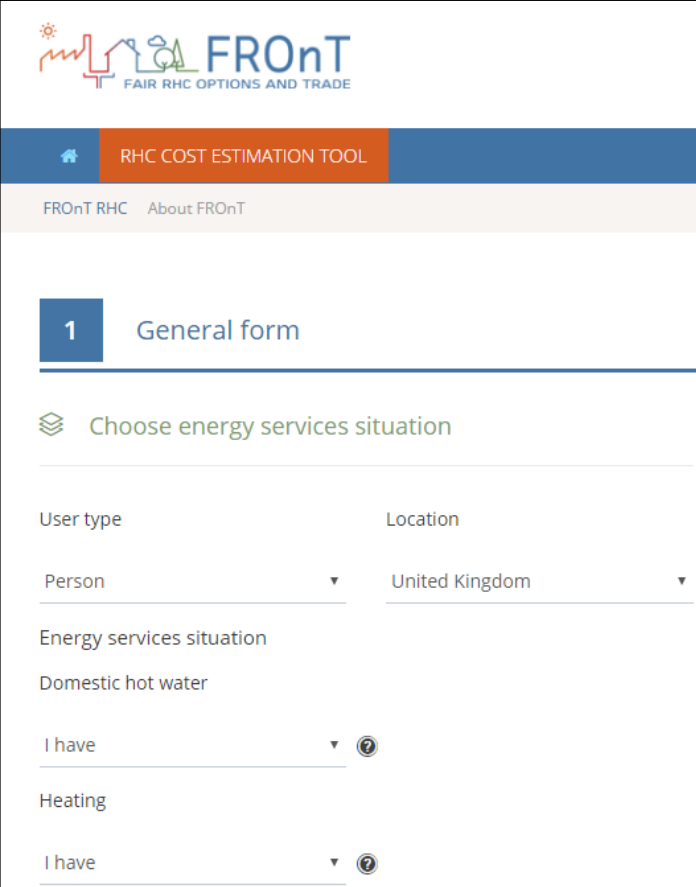
# FRONT ONLINE TOOL

The tool developed in the framework of the FROnT project assesses the competitiveness of RHC technologies by comparing the levelised costs (LCoHC) associated to them with those related to conventional fossil fuels

Four RHC technologies are analyzed: biomass, solar thermal, air-source heat pump and ground-source heat pump

The analysis is carried out in six reference locations: Austria, The Netherlands, Poland, Portugal, Spain and the United Kingdom

## User interface



The screenshot displays the user interface of the FROnT RHC Cost Estimation Tool. At the top, the logo for FROnT (FAIR RHC OPTIONS AND TRADE) is visible. Below the logo is a navigation bar with a home icon and the text "RHC COST ESTIMATION TOOL". Underneath the navigation bar is a sub-header "FROnT RHC About FROnT". The main content area is titled "1 General form" and contains a section "Choose energy services situation". This section includes two dropdown menus: "User type" (set to "Person") and "Location" (set to "United Kingdom"). Below these are two more dropdown menus: "Energy services situation" (set to "Domestic hot water") and "Heating" (set to "I have"). Each dropdown menu has a question mark icon next to it.

# FRONT ONLINE TOOL

## DISCLAIMER

The FROnT tool has been simplified to make it easy for end-users.

The calculations and results provided by the tool should be supplemented by real quotes from experts on the ground. An investment decision should not only be based on the results provided by the tool

## User interface

The screenshot shows the FROnT online tool interface. At the top is the logo for FROnT, which includes a stylized house and the text "FROnT FAIR RHC OPTIONS AND TRADE". Below the logo is a navigation bar with a home icon and the text "RHC COST ESTIMATION TOOL". Underneath the navigation bar is a section with the text "FROnT RHC About FROnT". The main content area is titled "1 General form" and contains a section titled "Choose energy services situation". This section includes two dropdown menus: "User type" with the value "Person" and "Location" with the value "United Kingdom". Below these are two more dropdown menus: "Energy services situation" with the value "Domestic hot water" and "Heating" with the value "I have". Each of these two dropdown menus has a question mark icon next to it.

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# PRESENTATION OF CALCULATION TOOL

1. LCoHC and its parameters

2. Online tool

I. Structure

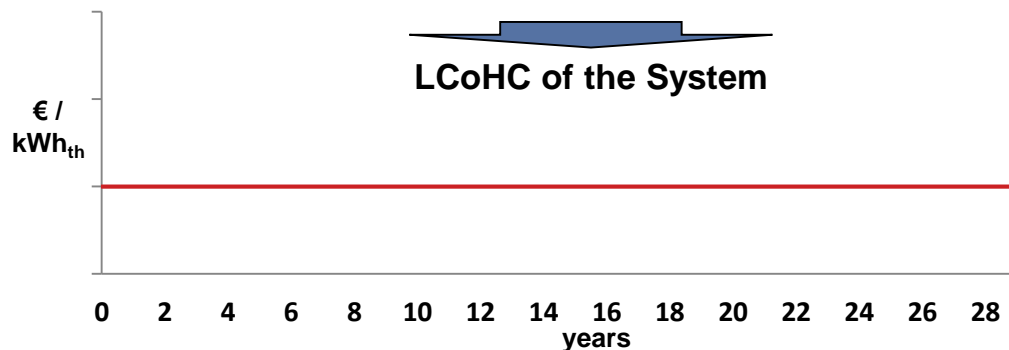
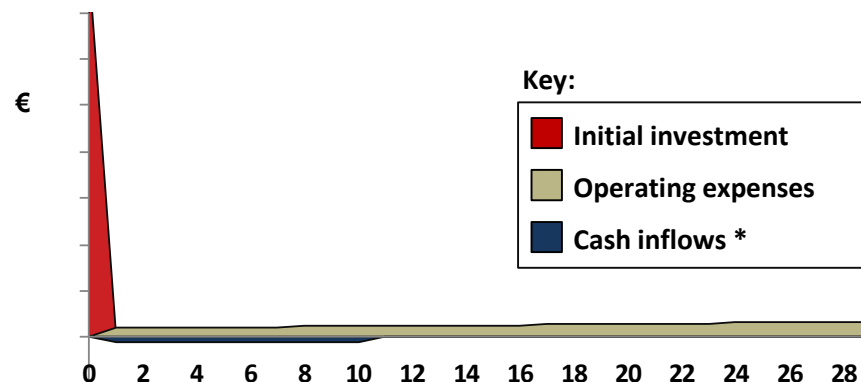
## THE LCOHC OF A SYSTEM REPRESENTS THE CONSTANT AND HYPOTHETICAL COST OF HEAT/COLD GENERATION OF THAT SYSTEM OVER ITS LIFETIME

- The LCoHC accounts for all costs associated with the RHC system over its life
  - These include initial investment, O&M costs and corporate taxes, among others
- It assumes a constant value per year and is expressed as cost per kWh<sub>th</sub>
- It considers the return required from the investment, to discount future costs (and energy generation) to present

### CAVEAT

To assess the competitiveness of a given RHC technology, its LCoHC should be compared with the levelised cost of the alternative technology (i.e. accounting for the estimated future price increases)

Cost flows of a RHC System (illustrative)



Note:  
Source:

\* Only if applicable, cash inflows can include subsidies, tax benefits, among others  
CREARA analysis

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# PRESENTATION OF CALCULATION TOOL

1. LCoHC and its parameters
2. Online tool

## I. Structure

# FRONT ONLINE TOOL: STRUCTURE (1/4)

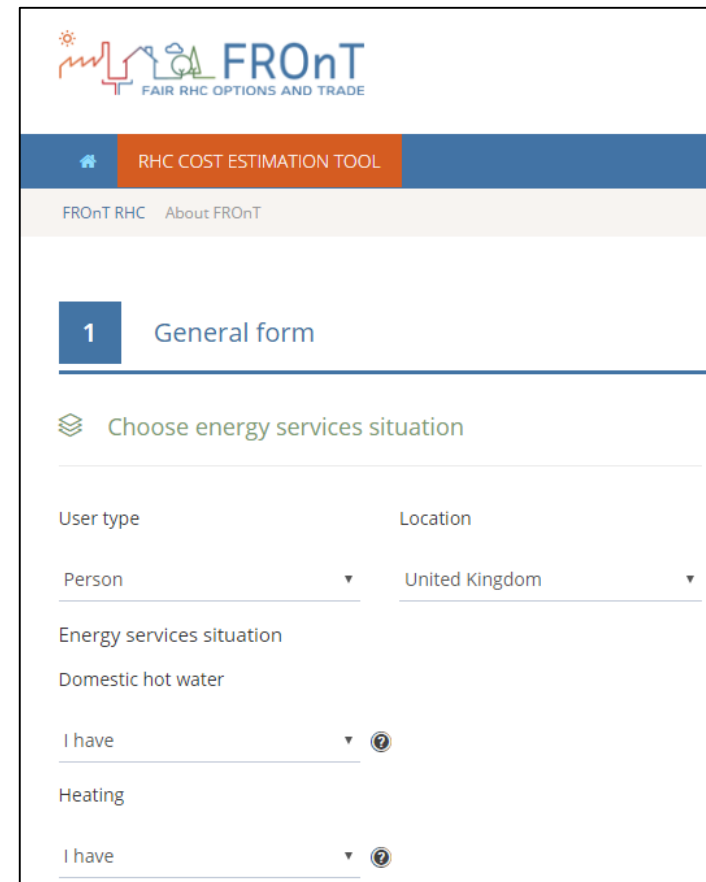
The online tool is divided into three major sections:

## 1. General information

The user selects the location to analyze, the user type (person or corporation) and the energy services to include in the analysis.

Three energy services are available in the tool: domestic hot water, space heating and space cooling (as a desired service)

### Step 1 of FROnT tool



The screenshot displays the 'Step 1 of FROnT tool' interface. At the top, the FROnT logo is visible with the tagline 'FAIR RHC OPTIONS AND TRADE'. Below the logo, a navigation bar contains a home icon and the text 'RHC COST ESTIMATION TOOL'. Underneath, there are links for 'FROnT RHC' and 'About FROnT'. The main section is titled '1 General form'. It begins with a heading 'Choose energy services situation'. Below this, there are two dropdown menus: 'User type' (set to 'Person') and 'Location' (set to 'United Kingdom'). Further down, there is a section for 'Energy services situation' with a dropdown set to 'Domestic hot water'. Below this, there are two more dropdown menus: 'Heating' (set to 'I have') and 'Cooling' (set to 'I have'). Each of these last two dropdowns has a question mark icon next to it.

# FRONT ONLINE TOOL: STRUCTURE (2/4)

## Step 1 of FROnT tool

The online tool is divided into three major sections:

### 1. Current system definition

The user is asked to fill in several key inputs related to his current (non-renewable) system

The tool includes both guidance and default values, when applicable, to ease the task

Reference system (current system) definition	
Energy source	Reference system power output
Electricity	
Electricity price	Reference system efficiency
0.22	
EUR/kWh	%
Electricity price annual growth	Fixed Operation and Maintenance annual cost
1.4	
%	EUR/kW



# FRONT ONLINE TOOL: STRUCTURE (3/4)


## Step 2 of FROnT tool

The online tool is divided into three major sections:

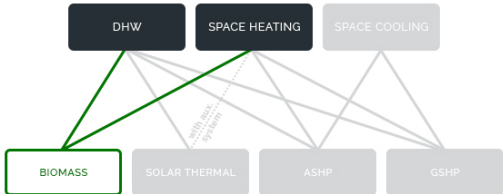
### 2. Renewable system definition

First, the user chooses the RHC technology to assess from those available according to the energy services selection

Then, information regarding the renewable system to be installed is requested. Guidance and default values for those inputs are included when relevant


 Technology and demand parameters

Please select the renewable energy source to be compared with the reference system. Please be aware that not all of the Renewable Heating and Cooling technologies can provide all the energy services.



Technology

☒ Biomass ☐ Solar thermal ☐ Air source heat pumps ☐ Ground source heat pumps

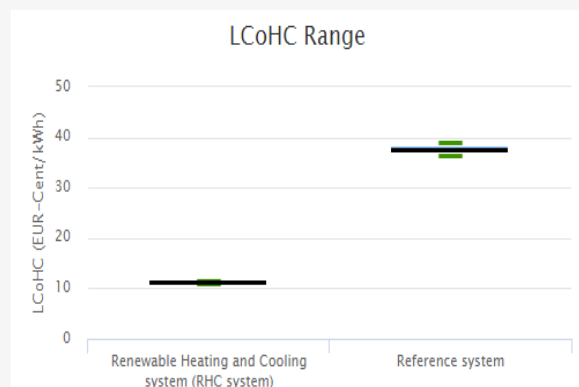
 Renewable system definition

Biomass	Investment-based subsidies	Operation-related data	Operation-based subsidies
Biomass system power output	Investment based incentive	Fixed Operation and Maintenance annual cost	Production based incentive (PBI)
5 ..... kW	0 ..... %	0 ..... EUR/ year	..... EUR/kWh

# FRONT ONLINE TOOL: STRUCTURE (4/4) OUTPUT

Three different outputs are provided:

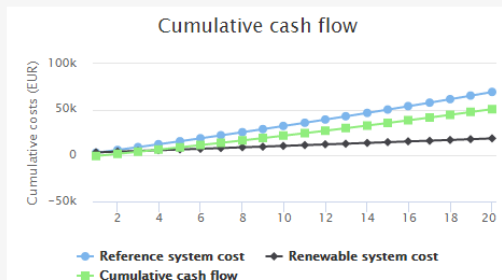
Renewable LCoHC	11.23	EUR -cent/kWh
Ref. system LCoHC	37.62	EUR -cent/kWh



## LCoHC

- Two LCoHC values are given for the RHC system considering, or not, the residual value.
- Ref. system LCoHC is given for comparison purposes.
- The results are shown as well in a chart, including a range representing the sensitivity analysis results.

Simple payback time	1	years
Net Present Value (NPV)	29606.97	EUR
Net Present Value (incl. residual value)	29606.97	EUR
Internal Rate of Return (IRR)	84.6	%
Internal Rate of Return (incl. residual value)	84.6	%



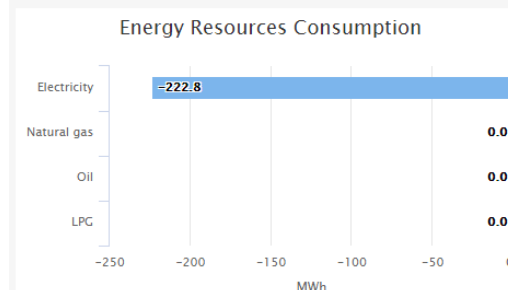
## Financial output

Three parameters are provided:

- Simple payback time
- Net present value (NPV)
- Internal rate of return (IRR)

Additionally, the cumulative cash flow is shown in a chart.

Greenhouse gases emissions reduction	79.55	Tonnes CO2
Electricity consumption difference	-222.82	MWh
Natural gas consumption difference	0	MWh
Oil consumption difference	0	MWh
LPG consumption difference	0	MWh



## Environmental output

- Greenhouse gases emissions reduction
- Energy resources consumption: A negative value means a consumption reduction and a positive value an means an increase (both in the table and chart).



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Co-funded by the Intelligent Energy Europe  
Programme of the European Union