FROnT

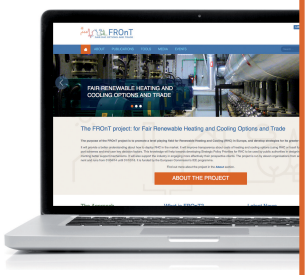
FAIR RHC OPTIONS AND TRADE

Promoting Fair Renewable Heating and Cooling Options and Trade in Europe

FROnT: A CONSORTIUM

The FROnT's work involved stakeholders from industry and public authorities from several EU member states including Spain, Portugal, United Kingdom, Poland, Netherlands and Austria. To bring the project to fruition, a consortium has been created gathering representatives from industry and national energy agencies, assisted by partners providing specific expertise.

Learn more about the project partners at:
www.front-rhc.eu/about/partner-organisations/



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FOREWORD

According to Eurostat, the gross final consumption of energy in the European Union in 2014 was approximately 1100 Mtoe, 45% of which for heating and cooling and only 25% for electricity. The total contribution of all renewable energy sources to the energy system was of approximately 180 Mtoe. Out of these, the RES sector that contributed the most, with 49% of all RES, was renewable heating and cooling (RES-HC), with 87.4 Mtoe. RES electricity (RES-E) represented 42% (69.4 Mtoe) of the total RES generation. And out of RES-E generation, 40% (30 Mtoe) was produced by large hydro, another 40% was produced by wind and photovoltaics and the other 20% by other RES sources.

The fact that heating and cooling is such a massive part of the energy system, and that RES-HC generation is therefore higher than RES-E might come as a surprise to many policy makers, but is a fact that was clear to the RES-HC sector. The challenge of decarbonising the heating and cooling sector, via greater deployment of RES-HC, has been constantly underestimated, which is made evident by the unbalanced approach, in terms of policies and policy-driven investment, between RES-HC and RES-E.

It is therefore essential to have more information and a better understanding of the heating and cooling sector and the potential contribution of Renewable Energy Sources such as biomass, geothermal, aerothermal and solar thermal to the decarbonisation of our heating and cooling supply.

The purpose of the FROnT consortium was to create Fair RES-HC Options & Trade. It tried to provide a better understanding on how to deploy RES-HC in the market. It looked for ways to improve transparency about costs of heating and cooling options, either using RES-HC or fossil fuels. It analysed RES-HC support schemes and end-user key decision factors. And, using the knowledge gathered, it developed Strategic Policy Priorities for RES-HC to be used by public authorities in designing and implementing better support mechanisms. And we also expect that it will also support the industry in engaging more effectively their prospective clients.

The decarbonisation challenge, allied with the need to reduce our dependency on energy imports while providing energy at affordable and competitive conditions, makes the need for a fuel switch to renewable heating and cooling a political priority. A priority that can provide results in the short term (2020), as well as in the long term (2050).

We hope that the results of FROnT can help to untap the potential of renewable heating and cooling!

Pedro Dias
Project Coordinator

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1 DEVELOPING STRATEGIES AND TOOLS FOR GREATER DEPLOYMENT OF RENEWABLE ENERGY SOURCES - HEATING AND COOLING (RES-HC)

The purpose of FROnT initiative - Fair Renewable Heating & Cooling Options and Trade - is to promote a level playing field for Renewable Energy Sources - Heating and Cooling (RES-HC) in Europe, and develop strategies for its greater deployment.

Created in March 2014 and co-funded by the Intelligent Energy Europe (IEE) programme, FROnT is a consortium of national energy agencies, research institutes, NGOs and trade associations developing research, tools, and strategies which will enable the wider deployment of Renewable Heating and Cooling in Europe.

This initiative strived to improve knowledge and understanding of the costs of heating and cooling, on how support schemes can be effectively designed, and how information can be made clear and transparent for consumers.

In order to support the efficient and cost-effective implementation of the National Renewable Energy Action Plans, the FROnT initiative has identified strategic policy priorities at national and European levels which will support a stronger uptake of Renewable Heating and Cooling solutions.

By researching existing support schemes and engaging with stakeholders, or for example by conducting studies onto what factors affect consumers' decisions when making choices about their heating and cooling systems, it was possible to identify what makes support schemes successful in terms of design, implementation, operations and monitoring.

Furthermore, FROnT also aimed to improve transparency about the cost of heating and cooling and its value. For that purpose, a common methodology for estimating the value of thermal energy was developed, comparing renewable and sustainable options with incumbent ones.

These outputs from the FROnT project shall assist individuals, in their professional or personal decisions. The tools available can assist European or national policy makers, consumers or installers in making better informed decisions, contributing to decarbonise the heating and cooling sector.

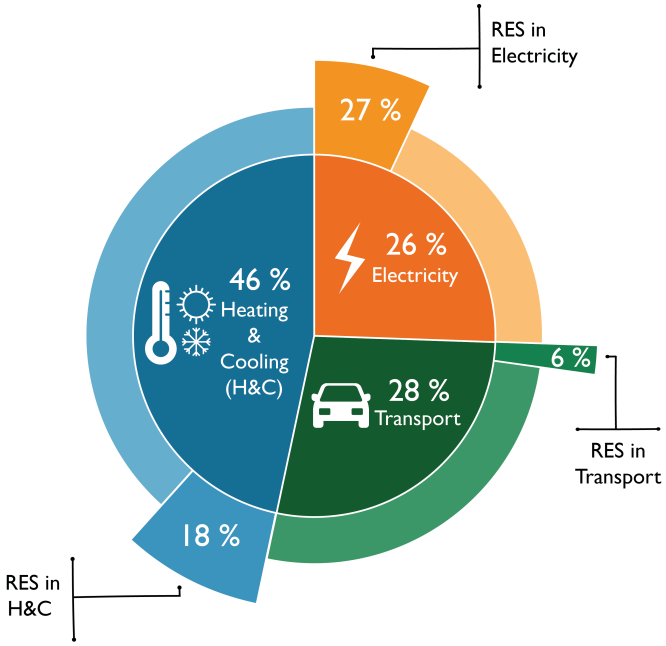


Fig. 1: EU28 Sector's shares on total generation (inner ring) & RES shares for each sector (outer) for 2014

2 RES-HC TECHNOLOGY AND MARKET DEVELOPMENT

About half of the energy used in Europe is dedicated to heat and cool our homes, offices and businesses. Around 72% of the gas used in Europe, much of which is imported, is for heating buildings and industrial processes. Concerns are growing about unstable gas prices and energy security.

The best alternative to reduce our import dependency is the use of Renewable Energy Sources for Heating and Cooling (RES-HC). It can provide substantial CO_2 savings, while reducing our dependency on fossil fuels and creating local jobs, helping to revitalise the European economy. In spite of these facts, RES-HC has been overlooked in public policy and public life. In fact, the European Union (EU) could save up to €21.8 bn annually on fuel imports by 2020 if 25% of the heat demand was covered with renewables.

According to Eurostat, the Gross final consumption of energy in the European Union in 2014 was approximately 1100 Mtoe, 45% of which for heating and cooling. The total contribution of all RES to the energy system was of approximately 180 Mtoe.

End-user	Services	Temperature level	Role of RES
Households	Space heating / cooling and domestic hot water	Low-temperature heat (up to 60° C)	Covered by RES-HC
Tertiary (Supermarkets, malls, offices, hotels, swimming pools, etc.)	Space heating / cooling and hot water	Low-temperature heat up to 95° C	Covered by RES-HC
	Greenhouse heating Irrigation with warm water in agro-industries	Low-temperature heat between 60-90° C	Covered by RES-HC
Industry	Heat and hot water for washing, rinsing, and food preparation.	Low-temperature heat up to 95° C	Covered by RES-HC
	Steam for industrial processes, notably to evaporate or dry	Medium temperature between 95° C and 250° C	Can be covered by RES-HC
	Heat for the manufacture of metals, ceramics, glass (through hot flue gases, electric induction, etc.)	High-temperature heat from 400° C up to over 1000° C	Can be covered with re-newable electricity

Table 1: Heating & cooling demand by service, end-user, and temperature

Out of these, renewable heating and cooling contributed the most, with 49% of all RES (87.4 Mtoe). As a reference, RES electricity represented 42% (69.4 Mtoe) of the total RES generation.

Renewable Energy Sources – Heating and Cooling (RES-HC) covers the following technologies:

- → Solar thermal,
- → Bioenergy,
- → Geothermal,
- → Geothermal heat pumps,
- → Air-source heat pumps,
- → Water based heat pumps
- → Micro, small and large scale collective systems.

Most of the energy supply for H&C (75%) is generated by burning fossil fuels, which is unsustainable from an economic, environmental, and social point of view. There is therefore an urgent need to reduce energy demand and to supply fossil fuels with sustainable energy. Renewable heating and cooling technologies can replace gas and other fossil fuels in the residential and tertiary sectors as well as for several industrial processes.

It is expected that the combined energy supply of RES-HC in the EU will reach 111 Mtoe by 2020, or 21% of the heating and cooling consumption. The scenarios of future deployment included in the latest European Commission's progress report show a decrease in the surplus of RES-HC contributions, which will lead to a deficit by 2020.

As highlighted by the European Commission in their Renewable energy progress report (European Commission, 2015) and in the post-2020 Clean Energy Package (European Commision, 2016), further policy measures and actions are required to achieve the renewable energy targets in the heating and cooling sector.

The tools and recommendations developed within the FROnT project and available online aim to pave the way for faster RES-HC deployment and towards the full decarbonisation of the residential, tertiary, and industry sectors.

3 A DEEPER UNDERSTANDING OF END-USERS DECISION MAKING FACTORS

One of the objectives of the FROnT project was to improve the understanding of what are end-users key purchasing factors for heating and cooling systems in five EU countries: Netherlands, Poland, Portugal, Spain, and the United Kingdom.

The survey, conducted by specialised companies under the coordination of the respective energy agencies, has covered the residential, non-residential and industry sectors. The study examined why current systems are used, where users get information about thermal energy equipment, why they choose some systems rather than others how they perceive different sources of energy, and their sensitivity to price changes.

The research was conducted to provide public authorities and businesses with information about how to effectively communicate with their audiences about the energy choices they make, and to improve the understanding on how a shift to renewables can be achieved.

The combined results for the three groups analysed, namely, the residential, the non-residential, and the industrial sectors, as well as the full country reports are available on the project website.

The survey provided an important source of data allowing for different analysis based on different criteria. For instance, results may be analysed per sector, country, type of existing system, among other options. The results are summarised in different reports and the data is available for additional or tailored analysis by experts**.** The data collected was the result of 4 195 interviews in the residential sector, 896 in the non-residential sector and 585 in the industrial sector.

It is obviously difficult to summarise such richness of data, though some clear trends could be identified. **For all sectors, professionals are the main source of information but private users also rely heavily on the advice of their relatives. Total economic savings is one of the most important factors when choosing a system; it's the most important factor for the residential sector and the second most important for others, coming just behind reliability.**

STUDY OUTCOMES

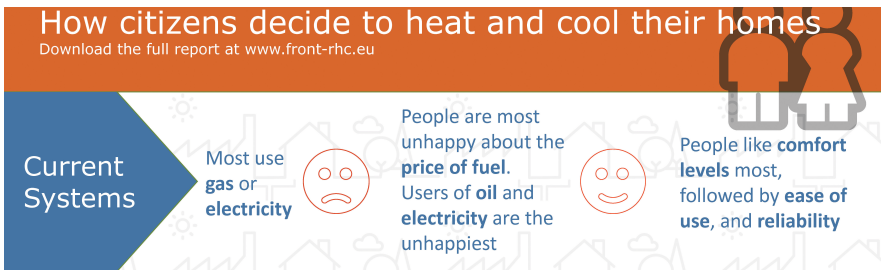


Fig. 2: Infographic - How citizens decide to heat and cool their homes

The FROnT initiative led a study which assessed the perception of RES-HC in the residential, tertiary, and industrial sectors. In particular, it highlighted the main factors which influence end-user purchase decisions. Based on this study, the FROnT project partners created several tools for consumers, including FAQs and fact sheets.

The main results of FROnT's survey are available on the website.

Non-residential consumers present the greatest level of awareness on RES-HC technologies, followed by the industrial sector. Households are the least aware, suggesting the need for further information campaigns targeting this group of consumers. **The industrial sector is the most willing to pay for RES-HC technologies.**

In general, consumers think that renewables have high investment costs but deliver high economic savings. It is the need for an initial investment that prevents most people from installing renewables, followed by the perceived burden of structural changes involved and the need to require the approval by neighbours. Most people are largely satisfied with their existing systems, but are unhappy about fuel prices. In general, the main source of information for end-users is the advice of professionals. This is especially the case for the non-residential and industrial sectors, while for residential consumers there appears to be other important sources of information, such as the internet or relatives.

The survey also delivered valuable findings on the perception of consumers in the residential, non-residential, and industrial sectors. This information was used as a basis for the FROnT consortium to develop suitable tools aimed at supporting end-users on their decisions to install or replace elements of their H&C systems and to inform about useful instruments such as buildings' energy performance certificates and the most recent energy labelling system for heating and DHW devices.

4 COSTS AND PRICES

The main part of the FROnT work on costs and prices consisted in the analysis of the relevant factors behind the determination of costs and prices of heating and cooling technologies and in the development of an online tool available for end-users.

This tool will facilitate transparency and comparability of H&C options and will constitute a reliable basis for energy production value estimates that can provide objective criteria for legislation and support schemes across Europe. Likewise, as assessment of levelised costs of heating and cooling has been performed to measure up RES-HC solutions against reference fossil fuel technologies.

To make energy projects comparable in terms of costs, the common metric used is the Levelised Cost of Energy. FROnT identified a methodology that would allow to identify the Levelised Costs of Heating and Cooling (LCoHC).

The **LCoHC is defined as the constant and theoretical cost of generating one kWh of heat/cold**, which is equal to the discounted expenses incurred throughout the lifetime of the investment.

Based on a sensitivity analysis, three parameters were identified as the most relevant to be determined:

- **Heat/cold generation** throughout the life of the system.
- **Total expenditures** throughout the life of the system, including capital expenditures, operating expenditures, decommissioning costs, and financial costs if applicable.
- The appropriate **discount rate.**

To assess the competitiveness of a given RES-HC technology, it is necessary to derive the costs of a system (accounting for its characteristics: technology, quality, size, location, etc.) and compare them with the specific cost of an alternative technology. In this sense, it should be stressed that the LCoHC remains constant throughout the life of the system. Therefore, it should be compared to the levelised cost of the alternative technology (i.e. accounting for the estimated future price increases).

In doing so, the following elements shall be considered: discount rates, investment costs, depreciation of fixed assets, replacement costs, operating costs, economic and technical life, residual value, incentives, taxes - income and Value-Added Tax (VAT), and energy generation.

The methodology developed estimates costs from the perspective of the investment as a whole. As such, it excludes financing considerations within the cash flows used. On the other hand, it facilitates the calculation of financial parameters that help investors assess the attractiveness of the alternative options, such as Net Present Value; Internal Rate of Return and Payback period.

The methodology and the analysis that led to it was used in the development of an online tool, aimed at helping consumers to compare RES-HC technologies with other options in the market. This tool provides an overview of relevant factors for comparing RES-HC systems with conventional systems.

Taking into account the diversity of options and the complexity of providing an accurate estimation of heating and cooling demand, the tool was purposely simplified in order to be used by consumers. It shall not be a base for a final decision but rather a basis for understanding potential benefits of renewable heating and cooling options and how to assess them.

The tool is prepared to account for three different energy services demand:

- Domestic hot water (DHW);
- Space heating;
- Space cooling.

CREATION OF THE LEVELISED COSTS OF HEATING AND COOLING (LCoHC)

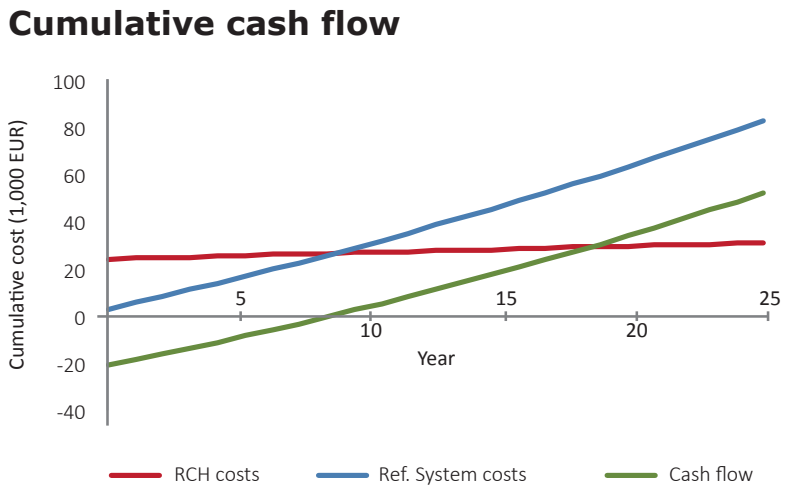
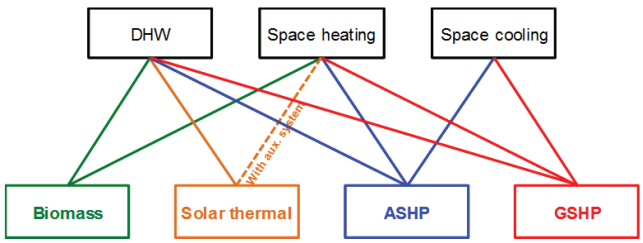


Fig. 3: A financial output from the Levelised Costs of Heating and Cooling tool

The methodology is accompanied by a tool allowing end users to compare the costs of a RES-HC system with the reference fossil fuels system costs in order to obtain the relevant information for their purchasing choices.

However, not all the four considered technologies can satisfy all three energy services. The following figure shows the relationship between energy services and RES-HC technologies:



Schematic 1: Energy services and RES-HC technologies.

Using a life cycle approach, the comparison takes both the initial investment and the operating cost of the system into account. Three different outputs are calculated:

- LCoHC comparison (including range and residual value)
- Financial parameters
- Environmental parameters

These outputs are expressed in a clear and simple way to the consumer, including with a graphical representation of:

- Cost of energy unit generated (kWh);
- Cumulative cash flows (return on investment);
- CO_2 emissions savings.

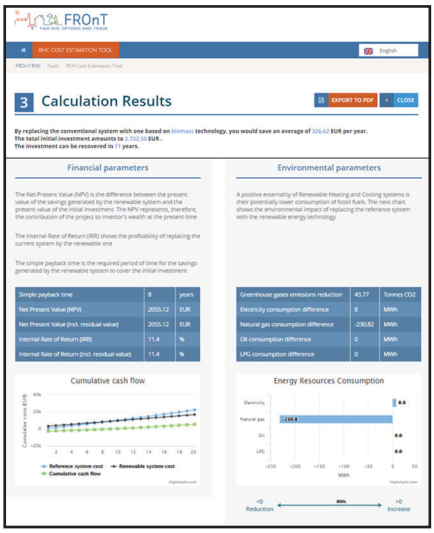


Fig. 4: FROnT cost evaluation tool: Output

In order to complement the development of a LCoHC methodology and the creation of an online tool, the FROnT initiative also prepared a series of case studies addressing the calculation of levelised costs of heating and cooling for the four renewable technologies (Biomass, Solar thermal, Air-source heat pump, Ground-source heat pump) in four reference locations (Athens, Madrid, Stockholm and Würzburg) considering several building typologies (single-family, multi-family house) and context (renovation, new built).

The analysed cases included:

- Biomass:
  - → Domestic hot water and space heating in a refurbished multi-family house in Stockholm;
  - → Domestic hot water and space heating in a refurbished single-family house in Würzburg.

- Solar thermal:
  - → Domestic hot water and space heating in a new built single-family house in Athens;
  - → Domestic hot water in a refurbished single-family house in Würzburg.

- Air-source heat pump:
  - → Domestic hot water and space heating in a new built single-family house in Stockholm;
  - → Domestic hot water, space heating and cooling in a refurbished single-family house in Madrid.

- Ground-source heat pump:
  - → Domestic hot water and space heating in a refurbished single-family house in Würzburg.

The case studies are the result of implementing performance simulations on specific options in terms of location, systems and building considered.

The results of the performance simulation were complemented with updated parameters and real quotes from the market. These were then analysed, on the basis of the LCoHC methodology and using the tool developed by FROnT.

These reports are also available online in the FROnt website: www.front-rhc.eu.

5 STRATEGIC POLICY PRIORITIES AND SUPPORT SCHEMES: GOOD PRACTICES AND RECOMMENDATIONS

With current legislative framework and market conditions across the EU, it is very difficult for RES-HC technologies, such as biomass, solar thermal, geothermal and heat pumps, to compete with installations using conventional fuels. However, **these solutions are necessary if we want to decarbonise the heating and cooling sector, which represents 50% of EU's total energy consumption.**

To allow RES-HC to become competitive and deploy substantially on the heating and cooling markets, more action is needed to drive consumers' choices towards renewable solutions, likewise financial tools need to be efficiently set up to support this uptake.

To understand what can be done to promote a stronger uptake of RES-HC, it is important to identify the barriers hindering such development. Two of the main barriers to the deployment of RES-HC identified by the survey on the end-users side are:

- poor consumer awareness, and;
- higher initial investment costs.

In addition, project partners have identified two additional barriers on the supply side of RES-HC installations: the lack of strategic priorities in EU and national policy-making and unfair market conditions.

In order to devise policies that can effectively tackle the identified barriers, it is necessary to take into account several factors affecting the heating and cooling sector:

- Investors and end-users are very diverse
- RES-HC interaction with energy efficiency
- RES-HC technologies are heterogeneous and have different levels of maturity

Taken the points mentioned above, the FROnT initiative proposes a group of Strategic Policy Priorities addressing the different dimensions identified as relevant:

- Strategic priorities and governance
- Market conditions
- Awareness, quality and engagement
- Financing

Based on the diverse analyses, studies and tools, the FROnT consortium has also produced a series of policy recommendations that can help policy makers overcome barriers in the deployment of RES-HC. These recommendations also include priorities focusing on developing the potential of RES-HC in Europe for 2020.

Policy priorities

The policy priorities are focused on four topics:

→ **Having clear strategic priorities and governance** (Ex: Developing a long-term decarbonisation roadmap, including plans and milestones for 2030, 2040, and 2050);
→ **Developing better market conditions for RES-HC** (Ex: Incentivise Member States to establish stable, long-term, and off-budget mechanisms to support renewable heating and cooling technologies);
→ **Increasing awareness, quality and the engagement of citizens regarding RES-HC** (Ex: Improve visibility through energy performance certificates of buildings);
→ **Improving RES-HC financing options** (Ex: Raise the involvement of private financial institutions to develop new financial tools).

To learn more about the policy recommendations suggested by FROnT Consortium, please consult the website: **www.front-rhc.eu**

The proposals, detailed in one of the main outputs of the FROnT project - Strategic Policy Priorities for the Heating and Cooling sector, are summarised in the following table:

Strategic priorities and governance	Market conditions	Awareness, quality and engagement	Financing
Develop a long-term decarbonisation roadmap, including plans and milestones for 2030 and 2050	Space heating / cooling and domestic hot water	Disseminate information on RES-HC technologies available through communication campaigns targeting professionals, consumers and citizens, and promoting energy labelling	Understand the need to finance RES-HC solutions until the market conditions have been fixed
Develop consistent and mutually supportive legislation	Internalise negative externalities from fossil fuels	Improve quality of the training, qualification and engagement of professionals	Establish well-designed support schemes available for RES-HC to reduce costs and foster cost-efficient deployment of RES-HC
Pursue full decarbonisation of the building sector and support RD&I	Establish off-budget funds from carbon pricing mechanisms	Streamline administrative procedures related to support schemes	Increase awareness of existing support and financing opportunities
Develop policies to trigger renovation of existing buildings		Improve visibility through energy performance certificates of buildings (EPCs)	Have appropriate and streamlined administrative procedures related to permitting/ authorisation for all RES technologies
Develop favourable building codes		Engage stakeholders in dialogue when defining policy	Promote demand aggregation at local level
Improve the parameters of the modelling used for projections of heating and cooling		Promote district heating and the use of RES in District Heating, and also block heating	Raise the involvement of private financial institutions to develop new financial tools
Establish EU-wide definition and methodologies to take cooling into account in building codes, national statistics, and support schemes			

The priorities identified also reflect an assessment of the instruments, namely support schemes, addressing the heating and cooling sector. There are direct (i.e. financial aid and/or obligations) and indirect forms (e.g. favourable building codes, R&D funding) to support RES-HC technologies at different levels of maturity. The FROnT project has focused on issues related to financial incentives. It has identified key successful factors and best practices collected in a specific manual available on the website.

The content of the manual is primarily based on the findings of the assessment of 28 support schemes implemented in nine EU Member States. Through such review, the consortium has identified the following factors considered to be critical to the success of a support scheme:

- Contribution of different stakeholders;
- Stability and predictability;
- Transparency and accountability;
- Balance between financial adequacy and efficiency; and;
- Ensuring quality & performance.

Additionally, ensuring easy to understand and non-burdensome administrative procedures, reducing administrative costs, providing support to applicants as well as communication and marketing throughout the different phases of a support scheme are also considered very relevant factors.

The good practices reported are not exhaustive, but are rather inspiring examples of how successful support schemes could be implemented across Europe. The solutions depend on the market conditions of each individual country.

SUPPORT SCHEMES

Fig. 5: Manual of good practices setting up RHC integrated support schemes

If you want to learn more about the key success factors (KSF) for designing, implementing, monitoring and evaluating support schemes focused on RES-HC, please consult the following page of our website:

www.front-rhc.eu/library/#success

6 REACHING OUT TO CONSUMERS: USING MULTIPLYING EFFECTS

The outcomes of the work done in the framework of the FROnT project - Fair Renewable Heating & Cooling Options and Trade - endure beyond the project duration. The validity of the outputs varies according to the type of content. Some may remain relevant for some months or a couple of years, others are expected to last for much longer.

Therefore, it is possible and also important that these ouputs continue to be disseminated over the coming years. One of the concerns of the FROnT partners is how to facilitate the continuation of that process. In this regard, taking into account the characteristics of the heating and cooling sector, the target groups for that dissemination are diverse and with different roles. Furthermore, they are not easy to reach, particularly when there are limited resources for dissemination. This is why the FROnT initiative focuses in multipliers, i.e., those that can bring the information and training to a broader group of actors that will finally have an impact in the uptake of renewable heating and cooling.

A part of this work was done during the FROnT project, though it is important to facilitate the continuation after the end of this concrete initiative. One of the aspects that needs to be considered when trying to reach out to consumers is the decentralised demand and diversity that characterise the sector.

One of the challenges is then how to create this engagement. The FROnT project developed several tools targeting consumers, as well as proposals on how to better inform consumers regarding their heating and cooling systems and assist them in their decisions.

One of the available resources that might (hopefully) become outdated in the coming years is the report on support schemes or the survey on key decision factors.

The methodology for calculating the Levelised Costs of Heating and Cooling, on the other hand, is expected to last for a long period of time. The online calculation tool shall remain relevant also for a longer period, with increased relevance, if several of the default values that can assist the calculation.

As planned by the consortium, these resources need to be known and well understood by multipliers. As referred above, the FROnT initiative considers that the best way to reach out to those that have a role to play in the uptake of renewable heating and cooling technologies, considering the limited resources, is to use multiplying effects. This means that information and training would be provided to those groups that can, by means of their activities and responsibilities, disseminate it to the right target groups.

The main groups that can act as multipliers for the FROnT outputs are:

- Policymakers at the national, regional or local levels
- Technical staff and energy experts
- Industry
- Consumer and environmental NGOs

These multipliers can reach out to relevant target groups, those having an important role in the decision process that leads to the installation in a building (residential or commercial) or in a production line (for industrial processes) of a heating and/or cooling system using renewable energy.

For the characterisation of the target groups the following elements were taken into account:

- Will and ability
  - → Engagement
  - → Power
- Knowledge
  - → Technical
  - → Economical (and financial)

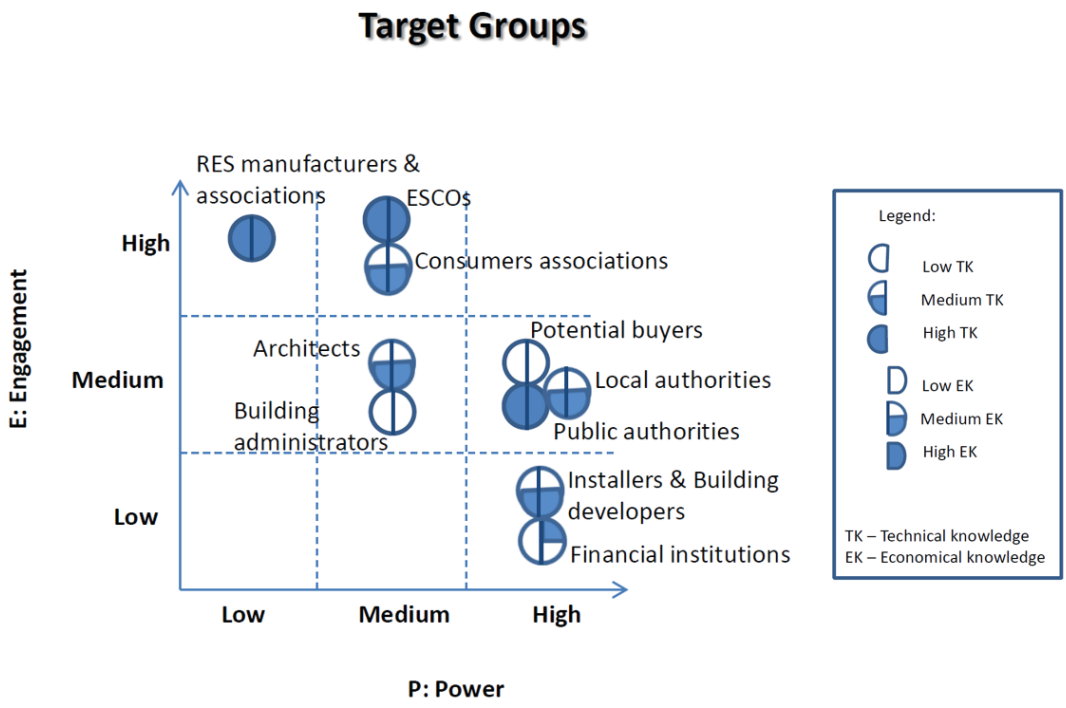


Fig. 6: Target groups for multiplying effects.

The priority shall be placed on those that have a strong impact in the decision process (high power). Nevertheless, those with high engagement but low power can still play a relevant role in the process, as facilitators or disseminators. The characterisation of the knowledge level shall assist in identifying the resources that can be better suited to each target group.

It then helps to design the Capacity Building Actions (CBA). The size, the duration and the content of the sessions may vary. It is clear that there isn't a one-size-fits-all solution. These actions need to be adapted to the goals and available conditions/resources. The balance between the quantity of participants and the quality of the session is important to assess. A session with a smaller group allows for more interaction, a more practical approach and more flexibility, adapting the message to the receivers.

The number of participants in the capacity building actions realised by the FROnT partners varied depending on different factors. Still, a number around fifteen participants for a half-day session was considered a good balance in terms of quantity of participants and quality of the results.

Some examples of the capacity building actions carried out by the FROnT partners are available on the website. These include an overview of the target groups, the topics covered and some of the main issues raised. These files can be used as a basis for developing new capacity building actions. The actions done by FROnT partners in the different countries used shared resources. As such, there are several presentations on different topics covered within FROnT available, which can be used for such sessions.

CONCLUSION

The heating and cooling sector represents almost half of the total energy consumption in Europe. This means that any attempt to reduce our carbon emissions and our energy imports will fall short if not addressing properly the heating and cooling sector.

Therefore, we need to understand if renewable heating and cooling sources (RES-HC) are an alternative to fossil fuels for heating and cooling supply. RES-HC, while representing "only" 18% of the heating and cooling supply, represent approximately half of the entire renewable energy generation in Europe.

In spite of this fact, it is clear that the **investment driven by policies or public support in this this sector is still lagging.** Several countries have developed support schemes addressing one or more RES-HC technologies. Some of these have been assessed, looking in key success factors for the design and implementation of support schemes aiming at promoting a switch from fossil fuels into RES-HC.

It is important to understand that **the heating and cooling sector is mostly decentralised in terms of energy demand and supply. Any change in the market needs the engagement of the consumers.** For instance, in the residential sector this means mainly building owners. A number of factors affect their decision and it is important that support schemes for RES-HC take into account the specificities of the sector.

From the analysis done within FROnT, the key success factors for such support schemes include the contribution of different stakeholders, stability and predictability in the framework, transparency and accountability in the process, balance between financial adequacy and efficiency; and ensuring quality & performance of the supported solutions.

Still, one can question if these technologies have additional benefits than just providing a carbon emissions savings. The method developed in the framework of the FROnT project to calculate the levelised cost of heating and cooling (LcoHC) demonstrates that **RES-HC technologies can compete with fossil fuels, when analysis takes into account the life-cycle costs of the systems. Still, the upfront investment for RES-HC is usually higher and represents a barrier for a stronger market uptake.**

This method is also applied in an online tool that aims at facilitating the assessment of different RES-HC solutions and compare it to the reference (the most common) system in a given market, providing an overview of cash-flows over the system operation, the levelised cost and CO_2 savings.

Even if these technologies are competitive in terms of levelised cost and are essential for emissions reductions in the heating and cooling sector, it is important to understand that other factors hamper consumer decision. The FROnT project has surveyed thousands of consumers in five different countries, with regard to residential, commercial or industrial applications. These results are publicly available in a report but also as raw data, so that experts can look further into this information. This fact is important because there is a clear gap in terms of studies and available data on the heating and cooling market.

This survey indicated that, on the consumers' side, there are **a number of factors that can be identified as barriers. The main ones are the lack of awareness and financing.**

Lack of awareness includes different factors that go beyond just the awareness about these technologies. It includes the access to simple and clear information about the different options and the motivational factors leading to a planned change of the space or water heating system. In a large number of cases, the replacement of a system is done because of urgent reasons: a boiler that broke down or is malfunctioning. **Such urgent replacements are**

In order to promote a change to RES-HC, consumers need to have enough information to motivate them to look for alternatives.

The other important barrier, financing of RES-HC, is rather relevant because of the upfront investment required by renewable heating and cooling systems. **Even if it is clear that in the lifetime of the system, RES-HC solutions are competitive with incumbent solutions, the higher upfront investment for RES-HC remains a critical barrier.** Therefore, measures addressing this financing barrier need to be implemented.

The analysis done regarding different factors has provided important input for the discussion on strategic policy priorities (SPP). These strategic policy priorities address not only the main barriers related to the demand side (consumers) but also the supply side (manufacturers). On the side of manufacturers of RES-HC installations, **unfair market conditions and lack of stable and coherent supportive policy framework have been identified as main barriers.**

These strategic policy priorities break down into a set of policy recommendations to be taken at EU, national and local levels, in order to allow further deploying RES-HC solutions. **Energy being a shared competence between EU and national levels, a combination of supportive policies at supra, national and local level are needed to effectively decarbonise the H&C sector and reach our mid/long-term climate and energy objectives.**

Finally, it is important to take into account potential multiplying effects that can help bring a change to the market. The consumers have a central role in the decarbonisation of the heating and cooling sector, through their behaviour and choices.

Hence it is important to promote capacity building among those agents that can help bring better information and advice to consumers. These action can be supported with different materials developed within FROnT, besides concrete capacity building actions, some of them developed by the consortium partners.

All these are only steps. They were clearly not the first steps in terms of promoting a stronger market uptake for renewable heating and cooling technologies. And even if they are important steps, they are just steps on the long path ahead towards a decarbonisation of heating and cooling supply in Europe.

We wish you a nice journey!


Welcome


PROJECT MEETING

FROnT

FAIR RHC OPTIONS AND TRADE

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