Title:	FR-1: Dissemination of numerical decision-making and design support tools for the integration of renewable energies into DHC
Abstracts:	With the desire to decarbonize DHC networks, it is necessary to support players in the energy sector in the choice and sizing of renewable resources that can be integrated into heating networks. The objective of the action is to strengthen the dissemination of existing digital tools, and to ensure their upgrading if necessary.
Latest update:	7. August 2023
Authors:	Delphine BOURDON, Chef de projet CEA
Region, Country	Auvergne Rhône Alpes, FRANCE
Partner	INES PFE – AURA-EE
Document Availability:	www.res-dhc.eu/

### **Initial situation**

In most communities that delegate the operation of heating networks, engineering resources are limited to explore the various options for decarbonising district heating and cooling networks by introducing renewable energy sources.

Most developers have to rely on external design offices and developers to develop the networks. Since major modifications can only be carried out every 20 to 30 years (depending on the delegation contract involved), it is important to support communities, developers and network operators in their choice of structural modifications in an efficient manner.

Some tools have been developed or are being developed for research centers or territorial development support units, and could provide support in decision-making, but they are currently insufficiently disseminated, known and used.

# **Targets**

The objective of the action is to strengthen the dissemination of existing digital tools, and to ensure their upgrading if necessary.

Increase awareness of the existing tools

Facilitate their use by training the target audiences in their implementation

Benefit from feedback from beta testers in order to develop user interfaces if necessary





### **Description of the measures**

The dissemination of digital tools for the choice and sizing of renewable resources will be carried out according to the proposals below:

1°) Presentation and documentation of available tools (ENRSim and Terristory type)

Each tool will be presented and documented in order to allow their good appropriation by the users.

Skills in training / dissemination of INES PFE digital tools will be necessary for the action.

Deadline: 3 months

2°) Dissemination of the tools to a few design offices and DHC operators for preliminary testing

Design offices and DHC operators will be contacted and the digital tools will be offered to them for testing for a period of 3 to 6 months

Deadline: 3 months - 6 months

3°) Feedback and improvement of tool ergonomics

After this test phase, the human/machine interfaces of the tools will be reassessed in order to better correspond to one or more uses by potentially different audiences.

Deadline: 6 months

4°) Dissemination of the tools more widely via online download.

In the event of positive feedback and significant evolution of HMIs, the tools will be made available for free download on a dedicated platform.

Period: 3 years

#### **Results**

The ENRSim and Terristory tools have been presented on various occasions, in particular during RSAG meetings or during specific workshops organized alongside national energy fairs such as Pollutec or BePositive.

As planned, the tools were distributed to a panel of beta testers in order to collect initial feedback on their respective uses.

#### ENRSIM :

The ENRSim tool was developed jointly by the CEA and INES PFE. It is a simplified calculation tool for multi-Energies production facilities (including renewable and non renewable) supplying a DHC network. The term simplified tool means a business-oriented and easy-to-use tool, to be differentiated from complex generalist dynamic calculation tools such as Trnsys, Dymola, etc. In order to best represent the dynamics of systems, the tool's calculation time step is hourly or less. The calculation core of the software, embedding predefined



- Provide the project development community (design offices, local authorities, operators, etc.) with a simplified calculation tool for solar installations connected to a heating network
- Integrate other renewable or waste heat generators and short-term storage into the tool
- Demonstrate the relevance of integrating predictive control functions into a simplified calculation tool

The software was offered for testing by a European panel of relevant users: INDDIGO (consulting and engineering company in sustainable development), NewHeat (provider of solar heat and recovery for large heat consumers), Planenergi (consulting company for the development and implementation of projects in renewable energies), and TVP Solar (Developer and installer of solar thermal power plants).

The objective of the working group formed was to be able to propose a relevant roadmap for further development of the software. The conclusions of the working group are as follows:

- The current need is to have an easy-to-use software allowing the realization of very fast studies (15-20 min of input) to encourage design offices to take solar thermal into account in their studies.
- The EnRSim software responds correctly to the request but is not deployed enough, due to the lack of communication but also due to the many ergonomic problems.
- The development of a web version with offline downloading of software and configuration files would solve ergonomic problems and facilitate dissemination to the public.
- In the long term, the objective would be to make the use of EnRSim systematic among design offices by making it an essential tool.

The establishment of a more detailed roadmap of priority actions for the improvement of the software has been achieved.

The actions concerning improvement of the ergonomy will be initiated by the CEA and INES-PFE as soon as an opportunity to finance this work arises.

In the meantime, the software is currently available for free download on the website <u>https://enrsim.ines-solaire.org/</u>

#### TERRISTORY :

The Terristory tool was developed as part of the RES-DHC project with the following functionalities: visualization of heating network routes; heat needs available renewable heat resources (geothermal, solar thermal, etc.).

A group of users of the Terristory tool was brought together to collect their feedback on the use of the tool on the developments made. The feedbacks have shown a good level of satisfaction with possible improvements



to complete the datasets with the potential for waste heat, solar thermal in car parks, cooling needs. These developments could be carried out based on the ENRezo project developed by CEREMA.

Distribution of tools:

The "heating networks" functionalities were presented in several events:

- Webinar "Developing heating networks", September 15, 2022, 30 participants
- Seminar "What solutions for the future for efficient heating networks?", November 25, 2022, 80
  Participants
- Webinar "heating networks", April 26, 2023, 60 participants

#### **Lessons learned & Impact**

#### ENRSim software download statistics :



There has been a significant increase in the number of downloads of the software (+50%) even though the year 2023 is only half past.



Factsheet Strategy and activities carried out *FR-1 Dissemination of numerical decision-making* 

# O RES OODHC

# and design support tools





It should be noted that the downloads made are mainly intended for design offices, operators, or building / project owners.



It should be noted that while the INES-PFE site remains the preferred vector of communication for distributing the software, conferences and exhibitions are also a good way to make the tool known and encourage its use.



#### Terristory usage statistics on heating networks:

- Displays of DHC networks: 1838 in total since July 2022 including 1139 since January 2023
- Heat requirements: 339 for residential, 173 for tertiary, 226 for total (residential + tertiary), 448 for industrial
- Geothermal potential: 482 for groundwater geothermal energy, 511 for geothermal energy on probes

The Terristory tool seems to be used by many territories to better understand the issues of planning and decarbonization of heating networks in Auvergne Rhône Alpes.





Title:	FR-2: Strengthen the technical and financial engineering resources of local authorities and heating and cooling network operators in the Auvergne- Rhône-Alpes region
Abstracts:	With the willing to decarbonize heating networks, it is necessary to develop energy sources that are still not widely exploited in Auvergne-Rhône-Alpes region: geothermal energy, thermal solar energy, waste heat, storage, regulation of networks, etc. These subjects are not yet mastered by all the players in the value chain and by decision-makers. The objective of the action is to reinforce the technical means of the actors.
Latest update:	7. August 2023
Authors:	Nicolas PICOU, Project manager renewable heating, AURA-EE
Region, Country	Auvergne Rhône Alpes, FRANCE
Partner	ADEME, Regional Council, FEDENE, local authorities, FNCCR, AMORCE, Energy local authorities, land managers
Document Availability:	www.res-dhc.eu/

# **Initial situation**

Local authorities usually delegate the operation of heating network: engineering resources are limited, and the control of the concession is carried out by specialised consultancies. As a result, the capacity of the local authority to plan and develop technically the heating network is relatively limited. Major modifications are carried out within the framework of a renewal of a Public Service Delegation (PSD), which occurs every 20 to 30 years.

On the operator's side, major changes can seriously alter the economic model, or require major amendments. Knowledge of innovative business models is not mastered by the operators but by the engineers and salespeople who prepare the responses to PSD. Moreover, there is a significant difference in the ability to perceive innovation amongst the operators.

On developers' side, they must rely on external service providers, and the level of technicality of the studies prior to the energy supply of a new district depends directly on the culture of the project manager who follows the project. While some have developed skills and shown an appetite for the development of green heat networks, this is not the majority.

### **Targets**

The objective of the action is to put engineering back at the heart of the public service delegation, both on the operator and the delegatee side:





- Technical engineering (knowledge of innovative solutions for the production of renewable energy, the efficiency of the heating network, storage and control),

- Financial and contractual engineering to find the contractual and economic terms that will allow the implementation of the relevant technical solutions.

### **Description of the measures**

The engineering required can take several forms:

- use of specialised external service providers,
- training of local authority engineers and in-house operators,
- development of decision support tools.

#### 1°) Definition of needs

The methods of engineering support will depend on the context in terms of internal resources, tool needs and the level of expertise required for each player. The first phase of the action will be designed to take stock of the needs of each category of actor (developers, local authorities, operators, etc.) and the subjects of expertise (intelligent network management, storage, temperature reduction, smoke condensation, solar thermal, geothermal, waste heat, legal arrangements, financial engineering, etc.).

Deadline: 3 months

#### 2°) Putting together an adapted offer

The engineering offer will depend on the needs expressed in the first phase of the action. It will include the training offer, external engineering services and the development of decision-making tools.

Deadline: 3 months

#### 3°) Search for funding

The last phase will allow the development of a funding programme to support this engineering offer by relying on national (CEE programme) and European engineering support programmes, in particular the ELENA and PDA (Project Development Assessment) programmes.

Deadline: 3 months

#### 4°) Commitment to the process

If the process is successful in obtaining funding for the engineering offer, the action can be deployed within the perimeter of the interested actors in order to have the engineering support offer.

Time limit: 3 years



#### Results

AURA-EE surveyed local authorities about their needs for more engineering resources for heating networks. All the local authorities questioned felt that their technical, financial and legal engineering resources were too limited to enable them to develop decarbonisation projects.

The PDA and ELENA project set-up offer was drawn up with the consultancy firm In Extenso.

This offer was communicated to the local authorities at a workshop on 12 September 2022. Five local authorities expressed an interest in the scheme. (Ville de Chambéry, Saint Flour communauté, Grenoble Alpes Métropole, Bourg en Bresse, Auvergne Rhône Alpes region) and two operators: Dalkia and Compagnie de Chauffage de Grenoble.

### **Lessons learned & Impact**

Local authorities have very little knowledge of European financial tools and rely mainly on national tools, such as the Fonds Chaleur, which is easier to mobilise. Furthermore, most local authorities do not have the financial engineering resources in-house to enable them to put together proposals for European calls for projects.

The ELENA and PDA schemes are not fully adapted to the needs of local authorities:

For ELENA, the minimum investment required is €30 million, which is only accessible to a few local authorities. Grouping is possible, but only if several local authorities are willing to join forces for investments that specifically concern each area, and with major uncertainties over the implementation of these investments in terms of deadlines, contracts, etc.

For PDA, the programme is very focused on engineering dedicated to market innovations, which is not very easy to mobilise for heating networks.

In conclusion, mobilising European engineering funding tools is not easy for local authorities and requires coordination at a higher level to mobilise more appropriate financial engineering resources and higher investment volumes.

- To date, no local authority in the Auvergne Rhône Alpes region has called on the service to set up an ELENA or PDA project.

- The replay of the workshop has been viewed 92 times on youtube.

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Factsheet Strategy and activities carried out FR-3 Financing intelligent grid management and thermal storage



Title:	FR-3: Financing intelligent grid management and thermal storage through the energy saving certificate (CEE) scheme
Abstracts:	Energy saving certificates are a mechanism for financing actions that reduce fossil energy consumption through a market mechanism. Energy operators have volumes of certificates to recover from energy savings project owners in exchange for their participation in the financing. Since 2019, activities subject to CO <sub>2</sub> emission quotas (including combustion for a power of 20 MW or more) are eligible for certificates in France. It is then possible to consider financing actions that were not previously financed by this scheme, in particular the storage and monitoring of heating and cooling networks. The action aims to submit to the Ministry a request for a CEE program or a standardized action sheet in order to propose a method of calculating the amounts of certificates generated by these investments.
Latest update:	7. August 2023
Authors:	Nicolas PICOU, Project manager renewable heating, AURA-EE
Region, Country	Auvergne Rhône Alpes, FRANCE
Partner	AMORCE, CEA, FEDENE, FNCCR
Document Availability:	www.res-dhc.eu/

# **Initial situation**

Energy saving certificates enable the mobilisation of funding from energy operators who have obligations to recover CEE over 3-year periods, with targets calculated according to each operator's energy sales. There are three different methods of obtaining energy saving certificates:

- The use of standardised forms which allow the amount of certificates to be calculated automatically according to technical variables and in a specific context (e.g.: collective air/water heat pump in a tertiary building to replace a gas or oil boiler).

- A valorisation within the framework of a program (validation of a certain number of actions carried out by an operator or project owner).

- The submission of a "specific operation" which must produce a calculation note of the energy saving modalities generated by an investment.

The advantage of standardised forms compared to other methods is that, provided the scope of the form is respected, it makes it possible to know in advance what aid can be obtained, without the hazard of technical appraisal.

The standardised sheets are submitted to a technical committee led by ATEE and ADEME.



# Factsheet Strategy and activities carried out FR-3 Financing intelligent grid management and thermal storage



The storage of heat or cold in networks and their instrumentation are currently not included in the scope of the standardised sheets, unlike, for example, the recovery of waste heat, the rehabilitation of a substation or the reduction of temperatures in networks.

### **Targets**

The objective of this action is to enable the creation of two standardised action sheets, one for the installation of storage capacity in a heating or cooling network, the other for the monitoring of substations in a heating or cooling network.

### **Description of the measures**

There is a simple process for producing standardized sheets:

- Drafting an opportunity sheet to justify the publication of a new standardized sheet,
- Examining the opportunity sheet by a committee of experts (ATEE, ADEME, DGEC),
- Publishing a a ministerial order formalizing the conditions for granting CEE for the actions provided for in the sheet (two per year).

For the completion of the opportunity sheet, it is necessary to specify:

- The context of the draft fiche
- The description of the initial and reference situation
- Existing or planned regulations
- Evaluation of the annual final energy gain generated by the operation
- Assessment of the potential in GWh cumulated
- The method of calculating the lump sum and the life of the investment
- Evaluation of the rate of coverage of investments by CEE

The action will consist in leading a working group in charge of defining the outlines of the standardized sheets, drafting their content and mobilizing the necessary expertise to feed the opportunity sheet.

Then, it will be necessary to follow the committee's examination of the file and, if it is accepted, to promote it to the actors likely to carry out this type of action (local authorities, operators).

If the form is not selected, it will then be a matter of assisting the project owners in the process of programming or submitting specific operations.



# Factsheet Strategy and activities carried out FR-3 Financing intelligent grid management and thermal storage

#### Results

AURA-EE has organised a Task Force to bring together all the players interested in creating an CEE sheet on the intelligent management of heating networks. This Task Force brings together the following partners: AMORCE, ATEE, Atlantic, AURA-EE, Danfoss, Dalkia, DistrictLab, Engie, FNCCR, Idex, Lacroix-Sofrel, Naldeo, SNCU, SYDER, Wilo.

All the participants wished to contribute to the creation of an opportunity sheet, which will then be validated by ADEME.

The Task Force met three times, in order to take full account of the interests of the various stakeholders and to gather feedback that will be useful in justifying the energy savings generated by intelligent control.

To date, the opportunity statement has not been finalised, but it is well advanced.

### **Lessons learned & Impact**

The creation of a standardised CEE operation form is a long and complex process. To be successful, the key players in the value chain of the operation in question must be mobilised and willing.

AURA-EE has succeeded in launching a national drive to bring this process to fruition, which has never happened before. It would appear that the RES-DHC project has provided sufficient feedback from other regions involved in the RES-DHC programme to enable AURA-EE to argue favourably with the various national players.

Intelligent control of heating networks can reduce the return temperature of the network by around 5 to 10°C, resulting in average savings of around 1.5% on the heat produced.

As the creation of the CEE form was not completed, there was no measurable impact at the end of the project.

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Factsheet Strategy and activities carried out *FR-4 Promote the creation of a network master plan* 

Title:	FR-4: Promote the creation of a network master plan in Auvergne-Rhône- Alpes
Abstracts:	In France, the State requires local authorities with a heating network prior to 2019 to draw up a "heating network master plan". In practice, although local authorities that have delegated the operation of their network to a private company have almost all drawn up this type of plan, the majority of local authorities that operate their own network do not have this part of the development study for their heating network. The action aims to mobilise local authorities that do not have a plan, to carry one out, and to include thermal ENR and storage more systematically in the specifications of these studies.
Latest update:	7. August 2023
Authors:	Nicolas PICOU, Project manager renewable heating, AURA-EE
Region, Country	Auvergne Rhône Alpes, FRANCE
Partner	AMORCE, ADEME, Collectivités
Document Availability:	www.res-dhc.eu/

### **Initial situation**

The master plans for heating networks are studies that allow the development of networks, their decarbonisation or their densification. Many local authorities that do not have technical services and that operate their heating network on their own do not have this type of plan, even though they are necessary if they want to benefit form ADEME financial aids. The plans are also financed by ADEME.

Due to a lack of time and resources or a desire not to extend their network to other subscribers, local authorities do not develop their heating network.

#### **Targets**

The objective of this action is to promote the creation of a master plan for small communities with a heating network.



- 1°) The first stage aims at targeting the communities concerned:
- Capitalization of the survey on network master plans (AURA-EE, 2021),
- Use of the heat network database (AURA-EE, 2021),
- Selection of communities according to criteria of date of commissioning, size, urban dynamics.
- 2°) The promotion of network master plans may be carried out in the following ways:
- Webinar on feedback from local authorities that have undertaken a master plan,
- Setting up case study workshops (use of databases and the Terristory® online tool),

- Individual assistance in setting up a master plan study (drafting of specifications, mobilization of funding, deliberation, etc.).

#### Results

The results of the survey carried out by AURA-EE make it possible to target those local authorities that do not have a network master plan. In fact, almost all of the local authorities that operate on a public service basis do not have a master plan, while most of the networks under public service delegation do have a master plan. At regional level, 120 heating networks are targeted.

Two webinars have been organised to help local authorities get to grips with the master plan approach:

Webinar "How to develop and support a heating network using a master plan", organised by AURA-EE, on 15 September 2022. This webinar was attended by 30 participants.

262 people watched the replay on Youtube: <u>https://www.youtube.com/watch?v=CPrz39sMj0Q&list=PL1zu\_U\_gwR51df9bQCe4DQ4P4SpzLb9OK&index</u> <u>=2</u>

Webinar "Heat networks, essential tools for the energy transition of territories", on 26 April 2023. This Webinar was attended by 60 people.

155 people watched the replay on Youtube: <u>https://www.youtube.com/watch?v=PRGSG3IP6-</u> <u>s&list=PL1zu\_U\_gwR51df9bQCe4DQ4P4SpzLb9OK</u>

A conference was organised on 13 February 2023 in Annecy: "Heating networks, essential tools for regional energy stability", attended by 60 participants.



### Lessons learned & Impact

The development of network master plans has increased in Auvergne Rhône Alpes for three reasons: The RES-DHC project, which promoted awareness-raising among heating network owners, the compulsory classification of public heating networks with more than 50% renewable energy in their mix as of the first of July, and the launch in 2022 of a call for projects entitled "One city, one network" by ADEME, which was open to new and existing networks. It is difficult to know exactly how much of this increase is due to the awareness-raising and skills-building activities organised by AURA-EE as part of the RES-DHC project.

Local authorities need tools to establish a precise scope for developing a network master plan, which is what the Terristory tool provides.

Taking the various events together, 567 people were made aware of the need to draw up network master plans.

The completion of more than 20 network master plans was realised in the region. It is estimated that this number doubled as part of the RES-DHC project.

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Factsheet Strategy and activities carried out *FR-5 Dissimination of documentation and analysis* 



# of best practices

Title:	FR-5: Dissimination of documentation and analysis of best practices
Abstracts:	The stakeholders of DHC in Auvergne Rhône Alpes do not have easy access to knowledge on the most efficient networks from the point of view of the integration of renewable energies, the reduction of network temperatures and thermal storage. This information is nevertheless essential to enable them to take ownership of the opportunity to upgrade existing DHC towards more sustainable practices. The action aims to identify best practices, already deployed or in the process of being deployed, and to disseminate their technical and economic characteristics through publications and project reviews.
Latest update:	7. August 2023
Authors:	Delphine BOURDON, Project manager CEA
Region, Country	Auvergne Rhône Alpes, FRANCE
Partner	
Document Availability:	www.res-dhc.eu/

# **Initial situation**

DHC stakeholders in the region Auvergne Rhône Alpes do not have easy access to knowledge on the most efficient existing networks, whether from the point of view of the integration of renewable energies, the reduction of temperatures of the network, making it possible to limit thermal losses, and of the possible benefits resulting from thermal storage.

This information is nevertheless essential to allow them to take ownership of the opportunity of changing existing heating networks towards economical and carbon-free practices.

### **Targets**

The objective of the action is to strengthen the dissemination of information around existing networks that have already deployed and implemented these practices. The action will focus on the following aspects:

- Reconstruction of virtuous and exemplary networks that exist or are being deployed
- Dissemination via publication and project review of the technical and economic characteristics of these networks to allow a better understanding of the possibility of local replication in AURA



Factsheet Strategy and activities carried out FR-5 Dissimination of documentation and analysis of best practices

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#### **Description of the measures**

At the start of the project, it was planned to carry out:

1°) Census of virtuous and exemplary networks that exist or are being deployed

A study will be carried out in order to restructure the existing networks in AURA or outside AURA which could be exemplary in terms of decarbonization.

The Danish networks may in particular be mentioned.

Deadline: 3 months

2°) Dissemination of their technical and economic characteristics so that each of the public concerned (local authorities, developers and operators) can appropriate the necessary information and identify the ways of replication on its own infrastructures.

Deadline: 3 months to 1 year depending on distribution opportunities

During the project, following discussion during RSAG working sessions between academic and industrial actors, the content of the action was revised in favor of a collection of actions from network operators that they consider key, from their experience, to decarbonize DHC.

### **Results**

Following this revision, a reduced list of questions was drawn up by the CEA (see below)

# Title of the survey: Your feedback on good practices for integrating renewable energies into heating networks

- 1) What is your company?
- 2) Regarding the latest renovations or modifications on your networks, what do you consider as key to reduce operating costs and/or to improve the operation of your system?
- 3) Are there any modifications or renovations on your heating networks that have not lived up to your expectations?
- 4) If yes, for what reasons do you think? (wrong sizing, bad installation, unsuitable for use, bad operation....)
- 5) In your short-term development, what do you see as the "flagship" measure(s) to make your networks more virtuous (energy costs and carbon footprint):
  - a. Audit of the existing substations' status (valves / exchangers / sensors, etc.)
  - b. Renovation of substations
  - c. Reduction of primary circuit temperatures
  - d. Automated smart management of the network
  - e. Leak detection



Factsheet Strategy and activities carried out FR-5 Dissimination of documentation and analysis of best practices

- f. f. Implementation / improvement of substation remote reading (real-time data feedback)
- g. Integration of more renewable energies on the networks
- h. Addition of centralized or decentralized thermal storages
- i. When possible, creation of new sub-network loops, operated at lower temperature
- j. Others...
- 6) What changes in regulatory conditions would you like to see appear to make heating networks more virtuous?

A "google form" type survey was then sent out to around thirty regional contacts of DHC operators.

List of operators contacted:

- DALKIA
- ENGIE,
- IDEX,
- EOLYA
- VEOLIA
- Grenoble heating company (Compagnie de chauffage de Grenoble)
- CORIANCE Group

Unfortunately, only a very limited number of responses was obtained despite multiple reminders (3/30, from Dalkia and ENGIE, or 10%, which is apparently the norm for this type of survey).

The results are however interesting in the sense that they rather point a co-responsibility between network operators and network users on the technological choices made. Typically, the operators point to a lack of renovation of the heat distribution circuits in the secondary loop (in the buildings served) which prevents them from being able to act on the primary loop, in particular by lowering the operating temperatures of the networks.



# Factsheet Strategy and activities carried out FR-5 Dissimination of documentation and analysis of best practices

# Lessons learned & Impact

- 1) Digital surveys, even in a "short" format, are not really effective in collecting enough information to be relevant.
- 2) In retrospect, it would undoubtedly have been interesting to include the managers of certain buildings connected to the DHC networks in the loop of recipients of this survey.
- 3) The co-responsibility pointed out highlight that it is necessary to better supervise / support the cooperation between the different actors of the actions to be implemented to avoid this type of break in the action.

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# Factsheet Strategy and activities carried out FR-6 Improving regional support schemes for innovation in heat networks



Title:	FR-6: Improving regional support schemes for innovation in heat networks
Abstracts:	In the Auvergne Rhône Alpes region, heating networks are supported by several schemes:
	<ul> <li>The Auvergne Rhône Alpes Region's call for projects finances investments in heating networks powered by renewable energy (wood, solar, geothermal) with a maximum length of 200 ml.</li> </ul>
	<ul> <li>To finance innovation, particularly thermal storage equipment, there is a specific scheme which allows 20% of the investment to be financed.</li> <li>This financing is based on the ERDF fund and favours partnership projects worth over €500,000.</li> </ul>
	The objective is to define the financing methods for innovative actions and to propose to the Auvergne-Rhône-Alpes regional counsil to adapt their aid system to facilitate access to financing for innovative solutions in heating and cooling networks.
Latest update:	7. August 2023
Authors:	Nicolas PICOU, Project manager renewable heating, AURA-EE
Region, Country	Auvergne Rhône Alpes, FRANCE
Partner	AMORCE, ADEME, Collectivités
Document Availability:	www.res-dhc.eu/

# **Initial situation**

Financial aid for heating networks is disparate, between the aid from the Fonds Chaleur and the Auvergne-Rhône-Alpes Region, several schemes can be mobilised by a single project, depending on its technical and legal characteristics.

In addition, the regional council has created an investment fund for renewable energies, which is very rarely deployed in heating and cooling networks.

### **Targets**

The objective of this action is to propose to the various funders a support environment for network projects that takes better account of innovation, with the goal to make funding more effective and easier to understand for project owners.



# Factsheet Strategy and activities carried out FR-6 Improving regional support schemes for innovation in heat networks

### **Description of the measures**

1°) Assessment of current funding arrangements:

- Analysis of projects funded by calls for projects meeting the objectives of RES-DHC,

- Simulation of the economic feasibility of innovative solutions for the development of renewable energy sources in heating and cooling networks with the application of current financing rules,

- Assessment of the capacity of project owners to mobilize the available funding (information, administrative capacity, instruction time, technical procedures, etc.).

2°) Definition of an intervention perimeter

- What objectives, what type of projects, what volume of projects, what support methods.

3°) Proposal of support modalities

The aim is to propose adjustments to the current arrangements to enable innovative heating and cooling network development projects to achieve a viable economic balance.

#### **Results**

With the participation of AURA-EE, the Auvergne Rhône Alpes Region drew up and adopted in September 2022 an ERDF sheet on the financing of solar thermal installations and thermal storage on heating networks and industrial installations.

On the basis of data collected from suppliers and consultancy firms, eligible investments in heating networks are in the region of €8 million, for which the ERDF would contribute an average of 20%, i.e. a forecast ERDF budget of €1.6 million over the period 2021-2027.

The precise arrangements for mobilising the ERDF to finance heating networks have not yet been determined: call for projects, application on an ad hoc basis, etc.



# Factsheet Strategy and activities carried out FR-6 Improving regional support schemes for innovation in heat networks



### Lessons learned & Impact

The Region's participation in the RSAG has been decisive in making solar thermal energy a priority for the ERDF in the Region.

One difficulty is the lack of strong coordination between the Region's Energy departments and the European Affairs departments. Despite this, AURA-EE's support in justifying the mobilisation of ERDF funding for solar thermal energy in heating networks succeeded.

As the funding is not yet operational, the impact cannot be measured.

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# Factsheet Strategy and activities carried out FR-7 Webinar on solar thermal in district heating networks for communities



Title:	FR-7: Webinar on solar thermal in district heating networks for communities
Abstracts:	Auvergne Rhône Alpes region counts about 250 heating networks of different sizes. The vast majority are small networks with a wood/fossil fuel energy mix. Fossil fuel energy is often used as a back-up in summer to optimise the operation of wood boilers. This is also the time when solar thermal energy is most effective. Local authorities with this type of heating network are not familiar with the possibility of solar thermal energy replacing fuel oil or gas, and are not aware of the financial mechanisms likely to accompany these investments. The organization of webinars for local authorities, elected representatives and local authority technicians will raise awareness among elected representatives on the subject of solar thermal production adapted to heat networks.
Latest update:	7. August 2023
Authors:	Nicolas PICOU, Project manager renewable heating, AURA-EE
Region, Country	Auvergne Rhône Alpes, FRANCE
Partner	AURA-EE, INES, CEA, Ville de Voreppe
Document Availability:	www.res-dhc.eu/

### **Initial situation**

In the Auvergne Rhône Alpes region, only one heating network has a solar thermal production, out of the 250 existing networks. The lack of information among elected officials and technicians of local authorities is a hindrance to the development of this solution, which is nevertheless efficient and competitive.

There is no visibility of this technology, solar thermal is confined to the production of domestic hot water in most minds, when they do not confuse solar thermal with photovoltaic energy.

However, solar thermal energy has significant financial support, which is not sufficiently well known neither.

### **Targets**

The objective of this action is to propose a series of webinars on solar thermal energy, and its use in heating networks, as well as on the aid modalities and the technical support available.



# Factsheet Strategy and activities carried out FR-7 Webinar on solar thermal in district heating networks for communities



### **Description of the measures**

1°) Definition of the webinar modules

- Definition of suitable content,
- Definition of conference formats and modes (workshops, case studies, feedback, conferences),
- Chaptering of content to produce a series of webinars.

#### 2°) Implementation of the webinars

- Webinar programming and communication,
- Registration of participants.

3°) Capitalisation

- Satisfaction survey,
- Improvement of content and form,
- Editing and distribution of webinar recordings.

### Results

The results of AURA-EE's work on webinars dedicated to solar thermal energy are very significant:

A first webinar was co-organised by AMORCE, AURA-EE, ENERPLAN, INES and ADEME on 4 May 2022. This webinar was attended by 130 participants.

In a second phase, a series of 5 webinars was co-organised by AURA-EE and INES:

- Preconceived ideas about solar thermal energy
- The fundamentals of solar thermal energy
- Solar thermal also has its own network
- Combining solar and geothermal energy



# Factsheet Strategy and activities carried out FR-7 Webinar on solar thermal in district heating networks for communities

# Lessons learned & Impact

The formula of a series of short webinars (1 hour) with specialist speakers and a progression in the educational content was very well received by the target audience. These webinars have also been published on the SOCOL national resource centre website, which has greatly increased their distribution and visibility.

Solar thermal energy is attracting renewed interest in the current energy context, and the sector is making progress in its various markets, despite legislation and incentives that have historically been more favourable to photovoltaics.

The number of studies into the use of solar thermal energy in heating networks has increased, with seven networks currently planning to integrate solar thermal energy in the Auvergne Rhône Alpes region.

These various sessions attracted 300 participants and the publication of the webinars on AURA-EE's Youtube channel generated more than 10,000 views, which is the best result for webinars broadcast via this channel to date.

It is difficult, if not hazardous, to estimate the impact of decision-makers' participation in these webinars in terms of action taken. Nevertheless, the number of projects involving the integration of solar thermal energy into heating networks has increased by a factor of 5 compared with the initial situation.

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Factsheet Strategy and activities carried out FR-8 Guidelines on technical issues for lower



# temperatures in DH

Title:	FR-8: Guidelines on technical issues for lower temperatures in DH
Abstracts:	Reducing the operating temperatures of DHC is an essential factor in enabling the development of low-temperature renewable energies, solar, geothermal energy and waste heat. However, the methods for reducing network temperatures are complex, and not necessarily only from a technical point of view, but also from a contractual point of view, because subscribers, through their consumption profile, generate an operation and an appropriate temperature regime. The purpose of this action is to explain the methodology that makes it possible to reduce network temperatures and provide the digital tools associated with better control of network temperatures.
Latest update:	7. August 2023
Authors:	Delphine BOURDON, project manager for CEA
Region, Country	Auvergne Rhône Alpes, FRANCE
Partner	INES PFE, Newheat, DistrictLab
Document Availability:	www.res-dhc.eu/

### **Initial situation**

Reducing the operating temperatures is an essential factor in enabling the development of low-temperature renewable energies, solar, geothermal energy and waste heat. However, the methods for reducing network's temperatures are complex, and not necessarily only from a technical point of view, but also from a contractual point of view, because subscribers, through their consumption profile, generate an operation and an appropriate temperature regime.

### **Targets**

The purpose of this action is to explain the methodology which makes it possible to reduce network temperatures and provide the digital tools associated with better control of network's temperatures.

The action will focus on the following aspects:

- Identification of the challenges and threats of reducing network temperatures (SWOT analysis)
- Proposal of management tools allowing networks wishing to turn to low temperature operation (in conversion or not).



Factsheet Strategy and activities carried out FR-8 Guidelines on technical issues for lower

# temperatures in DH

### **Description of the measures**

1°) Identification of the challenges and threats of reducing network's temperatures (SWOT analysis)

A SWOT analysis will be carried out in order to better understand the issues and threats related to the lowering of network temperatures by heating network operators.

Deadline: 2 months

2°) Development of network management tools to lower their temperatures (Districtlab type) and distribution to network's operators.

Deadline: 3 months to 1 year depending on distribution opportunities

### Results

Following the publication in early 2022 by the IEA of a very comprehensive guide (206 pages in English) on lowering the operating temperatures of heating networks (https://www.iea-dhc.org/the-research/ annexes/2017-2021-annex-ts2), it was finally proposed to readjust the content of the task by proposing the writing of a simplified guide, in French, and more adapted to the French context.

This guide, entitled "Urban District Heating: Towards low temperature networks" is made up of 5 synthetic and illustrated sheets on the following themes:

- Why lowering the operating temperatures of heating networks?
- DistrictLab: a tool for network's transformation
- Research to support network's transformations towards low temperatures
- New economical models for heat supply
- Example of a French low-temperature network integrating renewable energies: Narbonne





Factsheet Strategy and activities carried out FR-8 Guidelines on technical issues for lower

# temperatures in DH

The preparation of this guide was coordinated by CEA with the participation of INES PFE, NEWHEAT, DISTRICTLAB, and Florence Pillet for graphics / illustration.

This guide is currently being finalized / reviewed by national institutions / manufacturers who have committed to reviewing it and distributing it freely nationwide. In September 2023, it will be available for free download and hosted at least on the websites of:

- ADEME
- AMORCE
- BRGM
- CEA
- CEREMA
- ENERPLAN
- INES PFE
- NEWHEAT

### **Lessons learned & Impact**

The interest shown in the preparation of this guide by certain major national bodies shows that this type of communication vector is highly appreciated.

In particular, a national partner noted the interest of having this type of guide available, which "makes things that are sometimes complicated to read easily digestible".

However, the preparation of this guide took longer than expected, the work of "simplification" and harmonization of the concepts and work in progress being quite complex and requiring many round trips between the various writers and the graphic designer.

# A provisional version was nevertheless able to be distributed (on paper) during the Mix.E show in Lyon in April 2023. The first feedback from listeners / speakers is positive.

However, it will probably not be possible within the framework of the RES-DHC project to have quantified indicators on the number of downloads of the proposed guide.

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# geothermal sectors

Title:	FR-9: Animation of the solar thermal and geothermal sectors
Abstracts:	Solar thermal and geothermal sectors are poorly structured in the Auvergne- Rhône-Alpes region. Contrary to the wood-energy or biogas sectors, the actors do meet regularly, nor exchange or mobilise collective means to promote their sector with State services, local authorities and project owners. These sectors have a role to play in the decarbonisation of heating and cooling networks. The Auvergne-Rhône-Alpes Region and ADEME, aware of this lack, have initiated a dynamic for the animation of these sectors.
Latest update:	7. August 2023
Authors:	Nicolas PICOU, Project manager renewable heating, AURA-EE
Region, Country	Auvergne Rhône Alpes, FRANCE
Partner	AURA-EE, INES, TENERRDIS,
Document Availability:	www.res-dhc.eu/

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### **Initial situation**

In Auvergne-Rhône-Alpes, there is a lack of regional animation for some renewable energy sectors. And yet, the promotion of a sector allows a better structuring of the profession, dissemination of best practices and information between the actors, leader to market development.

### **Targets**

The objective of this action is to set up an animation of solar thermal and geothermal sectors, on a regional scale, develop the visibility of the related actors, and to make the sector evolve towards new markets, in particular heating networks.

### **Description of the measures**

1°) Solar thermal sector: SOL'AURA network

Animation of the sector by AURA-EE and INES

Number of actors mobilised: 30



# geothermal sectors



Number of regular meetings: 2 per year

• Means used: free opportunity studies, technical meetings, publication of feedback on solar thermal in heating networks,

- Time allocated to animation: ½ fulltime equivalent
- 2°) Geothermal energy sector: ANIGEO network

Facilitation by AURA-EE and TENERRDIS

- Number of actors mobilised: 50
- Number of regular meetings: 2 per year

• Means used: institutional lobbying, free opportunity studies, technical meetings, support for prescribers, implementation of a communication campaign, support for innovation,

Time allocated to facilitation: 1 fulltime equivalent

### **Results**

1°) The solar thermal sector

The solar thermal sector has been run since 2020 by AURA-EE and INES PFE. Meetings are held regularly, with between 20 and 30 stakeholders taking part. An action programme has been defined with all the players. It includes the dissemination of training courses dedicated to solar thermal energy in heating networks, the PICSol pre-sizing tool, and the promotion of reference projects (in particular a video of a site visit to the solar thermal installation on the Voreppe heating network, and the carrying out of opportunity studies on existing networks).

2°) The surface geothermal energy sector

The surface geothermal energy sector has been run by AURA-EE and TENERRDIS since March 2022. The 50 stakeholders meet twice a year, in a regional committee, to discuss the difficulties encountered, changes in regulations and public aid, and the actions undertaken as part of the regional coordination.

A series of 5 webinars was organised to share knowledge about geothermal energy, one of which was devoted to temperate water loops. This webinar was followed by more than 200 participants and the series has 5400 views on the dedicated Youtube channel.

### **Lessons learned & Impact**

The solar thermal and geothermal sectors are not well known to project owners and heating network operators. The main obstacles to the development of projects in existing networks are excessively high temperatures,



# Factsheet Strategy and activities carried out FR-9 Animation of the solar thermal and

# geothermal sectors



land and investment costs. Emblematic projects for new heating networks using geothermal energy on lakes (Saint Gingolph, Annecy), on groundwater (Alp'Arc) or on probes (Ferney Voltaire, Pringy) are helping to raise the profile of this solution.

The resources needed to run the sector are not guaranteed in the long term, and sources of funding need to be found to provide a clear economic model.

The stakeholders involved, particularly developers, are very interested in exchanging feedback on heat networks.

The only measurable impact is in terms of the time spent coordinating the value chains and the number of people involved.

The time spent coordinating the sectors has increased by 1.5 FTEs and the number of stakeholders involved in coordinating these sectors has risen to 80.

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# District Heating Systems

Title:	FR-10: Tools for an optimal decarbonation of District Heating Systems
Abstracts:	To meet the challenges of the energy transition, DHC networks must decarbonize their energy production in the same way as all energy suppliers. If a multitude of technologies today promise the production of heat with lower CO2 emissions, it is often complex for communities and network operators to identify, without a priori, which technologies and system architectures will enable them to achieve an optimal decarbonation of their heating networks.
Latest update:	7. August 2023
Authors:	Delphine BOURDON, project manager CEA
Region, Country	Auvergne Rhône Alpes, FRANCE
Partner	CCIAG
Document Availability:	www.res-dhc.eu/

Initial situation

It is often complicated for local authorities and network operators to identify, without a priori, which technologies and system architectures will allow them to achieve an optimal decarbonation of their heating networks. If the identification of renewable or recovered energy resources is starting to be quite well known at the local level, it is generally not optimal to rely on only one technology and it is still very complex to identify the best combinations between these technologies and quantify the benefits of each combination.

### **Targets**

The objective of the action is to develop and test, for potentially multi-energy local or territorial energy systems, specific multi-energy planning tools.

# **Description of the measures**

Development of planning tools for complex energy systems :

In order to better optimize the infrastructures of the various energy networks, a planning tool (at horizon 2050) is proposed on the basis of technical, economic and environmental analyses. Different scenarios for the evolution of energy demand will be considered. For the needs of the Grenoble Heating Company, the CEA is





required to test this tool to support the CCIAG towards its objective of completely decarbonizing the heating network of the city of Grenoble by 2033.

### **Results**

CEA is currently developing a internal inhouse software (called "PERSEE") allowing the optimization of energy production/transformation technologies by mathematical optimization (MILP type). The solution developed makes it possible to address the questions of technological choices in an agnostic way by evaluating and prioritizing a list of decision criteria dynamically with temporal projection. To do this, all the technological solutions for the production of energy from available resources (including renewable and wastes heat), or the capture of the CO2 emitted, are evaluated. As part of this study with PERSEE, 17 energy mix solutions were identified, leading to the generation of almost 1 million equations / constraints for the system with a resolution time step of the order of an hour. More than 250 calculations have been performed. The results made it possible to highlight a set of solutions front according to the programming of the feasible investment.



Net Present Value (€)

Figure 1: optimization under constaints (of maximal carbon emissions)



Factsheet Strategy and activities carried out FR-10 Tools for an optimal decarbonation of



# District Heating Systems



Figure 2 : Contributions of CO2 emissions for each optimized architectures

The systemic approach carried out in this study is totally reproducible for all local or territorial energy systems.

The software developed allows both a global analysis and consideration of specific transient behavior. It is perfectly adapted to the analysis of complex systems, operated in complex environments.

The feedback from the CCIAG on the studies carried out with this tool is very positive, in particular thanks to the perfectly objective results obtained on almost exhaustive criteria.

### **Lessons learned & Impact**

The effectiveness of the tool has made the CEA frequently called upon by industrialists of all kinds to support them in their choice of decarbonization solutions. The exhaustive and agnostic treatment of the data processed is a guarantee of confidence on the part of manufacturers.

An evolution of the tool towards supporting manufacturers in their water management (in addition to energy flows) is currently underway.

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