



SDHplus
Solar District Heating in Europe

*WP2 – SDH enabling buildings with high energy performance
Task 2.2 – Development of adapted and/or new models*

**D2.4 – Report on adapted
and/or new possible models
Format for reporting (language: English)**



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INTRODUCTION

*The information must be provided **in English**.*

Country **FRANCE**

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TOPICS TO BE INCLUDED

1. Which models are you planning to replicate? Please choose from D2.3 document

Introducing solar energy into district heating in France implies to determine which business models fit in existing models.

In France, the legislation provides three possibilities to run district heating:

- Public DH (*Régie* in French): the local authority takes decision, invests, builds and operates the DH. This model requires a skilled service and an investment capacity within the local authority. It is generally used for small DH.
- Public delegation DH (*Délégation de service public* in French): A contract (defining equipment, energy mix, heat prices...) is signed between an operator and the local authority to run a DH, as a public utility. The private company invests, builds and operates the DH, under the surveillance and responsibility of the local authority. We find this model especially for big DH.
- Private DH (*Réseau de chaleur privé* in French): A private operator invests, builds and operates the DH. An authorisation from the local authority is required, and a fee is paid by the operator to the municipality (fee based upon occupation of public space, not specific to DH), but there is no control by the local authority. This is not the most frequent model, but it is increasing with the development of eco district. This is the model of the first French SDH in Balma.

The following diagrams explain more in detail the role of different actors.

The following table (next page) shows, for each model presented in D2.3., whether this model is adapted to the French context or not. The evaluation is based on 3 aspects (technical, juridical, and cultural) to enlighten which business model are more likely to be replicated and the kind of changes that would be needed. The financial aspect (financing scheme) is not as important as these 3 aspects: if a project is profitable, stakeholders (and especially DH company) will find a way to finance it, with their business habits or even with new schemes. The key on the financial aspects is not different from one project to another: it depends mainly on subsidies, in order to compete with other energy sources (wood for example, for which there is public financial support from ADEME). Technical and juridical replicability, and changing stakeholders responsibilities and way of running DH are bigger difficulties. The level of replication is symbolised by 3 smileys (*unhappy smiley does not mean impossible but "hard or very hard to achieve"*).

Model example	principle	ownership		Adaptability			Observation / opportunities
		DH	solar	technical	juridical	Habits / cultural	
Braedstrup, DK (7)	Centralised production	Users		☹	☹	☹	Possible but unlikely on new DH. Hardly possible on existing DH

Hamburg, D (10)	Decentralised production ; seasonal storage ; unused or total solar production sold to DH	Private company	Users or private investor selling to user and DH	☹ or ☺ (new)	☹	☹	Possible on new DH. Unlikely on existing DH. Lack of contract examples for heat selling. New stakeholders dealing with both users & DH company to include. Makes building code respect easier (evolution needed)
Hamburg Energie, G	Feed-in model. DH operator buys 45€/MWh surplus heat from customers (max 20% of its own demand)	Local public utility	users	☹	☹	☹	Hardly possible on existing DH. unlikely on new DH. Lack of contracts examples. Feed in tariff are common for electricity but on a national level.
WW-Andritz, A	Centralised production	Private company	Private company (different or subsidiary)	☹ or ☺ (new)	☺	☺	Model exists for CHP plants. Need for subsidies to obtain a low heat price. Fairly simple on new DH, more difficult on existing DH because of the generally high temperature
statewerke Lehen, Salzburg, A (4)	Microgrid with centralised solar (& buffer storage) and heat pump, linked to city DH. Solar included in building construction costs	Local public company	Buildings owners	☺ (new)	☺	☹	Possible on new DH. Well adapted to new building code « spirit » (but requires ministry validation via a thorough case study for each project)
Malmö, S (1)	Decentralised production (maintained by DH comp.) ; no storage ; unused or total solar production sold to DH	Private company	Users (or leasing to DH company)	☹ or ☺ (new)	☹	☺	Possible on new DH. Unlikely on existing DH. Lack of contract examples for heat selling.
Crailsheim G (8)	Allocating centralised solar district heat to new buildings (using certificates) to fulfill renewable heat law	Private company	DH company	☺ (new)	☺	☹	DH mix would be easier to take into account than certificates in F. Requires building codes evolutions. Consistent with 2020 building code spirit
Dükstai, L	Centralised production – pre heat of return pipe on centralised boiler	Local public company	same	☺ (just need space)	☺	☹	Need for subsidies to obtain a correct heat price. Good combination with small biomass DH (reduces gas consumption when demand is to low to run on biomass)

The Braedstrup model is replicable in France, on a juridical point of view (juridical model called Aful – *Association foncière urbaine libre* – where each user is co-owner of the equipment), but it is very rarely used, being too far from the cultural habits in running collective equipment in general and DH in particular.

The Hamburg model presents two difficulties: it requires a feed in tariff for thermal solar (or at least a contract between the solar plant operator and DH operator), which would be very innovative, and DH temperatures low enough for solar to inject directly into the grid.

The building code encourages solar on building, for domestic hot water production (installing solar allows a higher heat demand – hence lower building costs). Only self consumption is con-

sidered, but it should be possible to oversize the installation and sell the production that is not used by the building, in cases where DH temperature allows such injection (mostly new DH).

The Andritz model is closer to technical and cultural habits: a centralised production is common, and it allows higher input temperatures. CHP operators are often subsidiaries of the DH operator, hence this model could be replicated for a solar plant, but it would require subsidies to compensate heat production cost gap between solar and gas or wood chips.

Following its feasibility study, Chateaubriant's project could be based upon this model.

In Salzburg and Malmö, the maintenance is performed by DH company, even though solar plants are installed on private buildings. This model is possible on new DH, and is studied on Chambéry project. Establishing a contract for heat selling is one of the key issues that are being carefully considered.

Crailsheim case, where centralised solar heat is allocated to new buildings, is interesting: its replication in France would allow buildings to obtain the advantages of using solar (on a building code point of view) without having to install solar plants themselves. It would however require changes on the building code, which should be possible to obtain with the evolutions foreseen in order to generalise zero energy building by 2020.

Dükstai project is the easiest to replicate in France: injecting on the return pipe reduces the difficulty of too high temperature levels. It could prove a good combination with small biomass DH, by reducing natural gas or fuel oil consumption when heat demand is too low during the summer to run on biomass. Furthermore, this model allows a very low return temperature (hence increasing distribution efficiency and solar efficiency) without having too high a gap between input and output in the boiler. There would however still be a need for subsidiaries, except maybe in simple cases where solar replaces mostly fuel oil.

As a conclusion, Dükstai, Andritz and Malmö seem to be the easiest foreign models to replicate in France, the last two being studied currently on two existing projects.

It is interesting to notice that the first French SDH project (Balma near Toulouse) does not correspond strictly to any of these models. In Balma, a private company invests and runs the DH, without direct involvement of the local authority. This model is fairly simple, and is already being replicated in Juvignac, near Montpellier. AMORCE remains prudent regarding this business model, as there is no control of the local authority, especially on the tariff for end users and its future evolution.

2. Which are the main changes needed in order to replicate the chosen models in your country?

Main needs are, on a short-term view:

- a specific line for SDH in the Heat Fund (national funding for RES heat)
- more information towards stakeholders (local authorities, DH operators, consultants, urban planners – the main point being changing habits regarding energy choices & temperatures),
- contract examples for selling heat from a solar plant installed on a building, or for maintaining such a plant by the DH operator

Main evolutions needed, on a longer term view, are:

- better consideration for SDH in the building code (link between how solar and DH are considered, consistent with the evolutions needed for zero energy buildings) to increase the possibilities to develop solar on new buildings, and especially on new districts (builders are currently encouraged to install thermal solar on new buildings, but the performance advan-

tage given on the building (which decreases building cost) does not exist if solar production is injected instead of used on the building.

- decreasing DH temperature. This necessity is now well known and admitted by stakeholders, but it can be technically challenging and very costly, even with the help of the white certificates scheme, which now includes this action among possible actions eligible to certificates.
- Decreasing buildings central heating temperatures (heat emitters): there is still a strong habit among heating engineers to design and run heating system within buildings with a 90/60 temperature range, which limits the possibility for DH to decrease its temperature.

3. Which stakeholders (utilities, local authorities, etc.) do you plan to involve?

Local authorities such as the cities of Toulouse, Montmélian, Châteaubriant and Chambéry have had feasibility studies that show that either centralised (on existing DH) or decentralised production (on existing and new DH) is possible. The operator involved is unknown for new projects as it will be chosen later on by the local authority according to public contracting procedures. SDH projects on existing DH involve until now only one operator (one of the two major French DH operators).

4. Please describe how the model will work and the role of the different stakeholders

Châteaubriant (see D3.1 Factsheet): COFELY is the private company who runs the DH service for the city of Châteaubriant (public utility delegation). Then it should invest and run the solar installation. Another model, where another company builds and runs the solar plant, and sells solar heat to the DH operator could also be applied and may be studied in the framework of SDHPlus. It would be more complicated as the solar plant operator will need guarantees that all its production will be bought.

Montmélian (see WP3 Factsheet, not yet published): a centralised model such as Andritz or decentralised such as Malmö could be applied. Being a new DH project, the possibilities are wider. On a juridical point of view, there are three major possibilities: either a public DH, run 'in house' directly by the city ("régie"), a public DH run by a private operator for the city or a complete private DH, the later being the less probable as the city is already well involved in the project.

Chambéry (see D3.2 Factsheet): The DH of Chambéry is run by the *Société Chambérienne de Distribution de Chaleur (SCDC)*, a subsidiary of COFELY, for the city of Chambéry (public utility delegation) since 1987. The solar installation planned for the new ecodistrict Villeneuve should be integrated in this public service delegation. The foreseen model is closed to Malmö's, with an independent low temperature loop (which takes heat from the return pipe on the main DH grid) to inject solar production to DH operator.

Les Izards – Toulouse. An important juridical evolution has occurred since the beginning of the study for this project: The Region of Toulouse ("Toulouse communauté urbaine") is now responsible for district heating development (instead of the municipalities composing the Region), following a new law published at the beginning of 2014 and concerning local authorities competencies. The business model is not chosen yet : it could be a private DH (such as Balma) or a public delegation.

5. What is the final aim of the model implementation?

The final aim is to have real cases running that can be replicated. For projects with public entities, the juridical aspects of business models have to fit within existing models but adaptations might be needed (additional clauses in contract between operator and local authority, and can be time consuming for first projects. Some organisational models from other countries are relevant and can give precise ideas of what could be done, but the juridical aspects have to be adapted locally to French legislation (and existing contracts for SDH projects on existing DH).

With French SDH plants running, solar on DH could become a classical option to be studied routinely in feasibility studies for energy supply of new districts and planning of evolution of existing DH¹.

For involved DH operators, the aim is to have them study internally the replicability on other DH they have in charge.

6. *Please include the foreseen timetable for the model implementation (hearing with stakeholders, preparation of draft documents, etc.)*

Les Izards - Toulouse > financial and legal feasibility study is to be finished by November 2014. The new DH to be constructed would supply heat to new buildings and also existing buildings, making it big enough to be developed according to a “public delegation” model.

Montmélian > The case study has been delivered to the municipality. It shows that SDH option has to be chosen if the aim is to maximise the energy share covered by solar in the city. The municipality has to make its choice and the first issues will then be in choosing how DH will be run and financed (in house, public private partnership or private). DH operator would in any case probably do the implementation and exploitation of the solar plant.

Châteaubriant > The solar plant should be included in the existing contract between DH operator and the city. The timetable depends then on the operator to evaluate other possible models and the necessary negotiations with the city to implement new clauses in the contract.

Chambery > This project will bring some innovation in France, on technical, financial and juridical aspects. The solar plants – implemented on the roof of new housing buildings - should be integrated in the existing DH public service and be run by the DH operator. Specific contracts will have to be established at least between real estate agents and DH operator and then DH operator and owners of the buildings.

7. *Describe the replication potential of your model (NEW)*

The first case studies provide a Feedback about the difficulties:

- French existing DH models are specific to France and already well defined, but without examples of buildings feeding-in any heat.
- only general juridical aspects can be foreseen here : legal aspects will require case by case studies with specific consultants mandated by the operator or local authority
- some financial issues are missing in the presentation of models which are necessary to evaluate if the model is interesting or not, and have a better idea of the amount of subsidiary that should be needed.

¹ Energy supply studies are compulsory in France for new district to be built – cf WP 4, task 4

Feedback about interesting points:

- The operator COFELY is really interested with new and foreign models
- several projects are well advanced and confirm the existing potential for SDH in France
- projects such as Chambéry are very innovative (and hence rewarding for stakeholders) but could nevertheless be replicated on other existing DH

The case where the solar plant is built and operated by the operator of the DH (either public or private) is no different than for any other type of heat production on DH on a business model point of view, except on the amount of potential subsidies that is needed in order to have a correct heat production cost. However, if the solar plant does not belong to the DH, contract models that precise the selling conditions and responsibilities between stakeholders will be needed. The main issue is to define price conditions and the contribution and role of the solar producer, the DH operator and the local authority in charge of the service. This business model is not the most likely to be developing soon.

In any case, we have to keep in mind that all this work initiated in SDHplus, might very well not be finished before the end of the project as such projects implementation takes time.

8. *Explain how is your model related to WP2, that is how the supply of solar district heat for new or existing and renovated buildings / settlements with high energy performance or even at nearly zero-energy standard can be a business opportunity (NEW; this part will not be published)*

The allocation of solar heat (produced centrally) to new buildings is very interesting on that aspect. The current building code (2012) requires an average consumption of 40 kWh (primary energy) per square meter for heat, domestic hot water being responsible for nearly half of that consumption. The foreseen building code (2020) should be based on zero energy buildings. Most stakeholders (among them the Ministry responsible for the code) are now aware that - especially in urban areas – a basic implementation of this requirement for each new building could lead to inappropriate results (to high buildings, or in the shade of another, could not be able to meet the requirement whereas unused roof space could be left on buildings with large roof compared to their energy needs). Hence works are already undertaken to define how the requirement could be globalised for several buildings in the same area, or take into account the area environment (which would very probably define how an existing or new DH has to be taken into account, according to its energy mix). There is hence an interesting opportunity for RES DH in general and SHD in particular.

More information on costs could emphasize this need for a specific approach to integrate SDH in the future building code, showing national decision makers the economical relevance of this technique compared to independent thermal solar plants on every building.

9. *Explain how you and the SDHplus project take part in the model implementation, e.g. you are the consultant, you provided the stakeholders with information, you are the DH association, etc. (NEW; this part will not be published)*

The French partners in SDHplus provide information to stakeholders on several aspects, with a good complementarity:

- Tecsol, a consultant company specialised in solar, is responsible for the feasibility studies. Its renown in solar business for more than 30 years enables it to disseminate information to the solar community and some local authorities

- Being a national research institute on solar energy, INES provides technical information and performance evaluation. They are able to disseminate information widely to the solar community.
- As a national association for local authorities and companies on energy and waste, AMORCE provides information mainly to local authorities, but also to DH operators (DH being the first subject of the association when it was founded in 1987).

The international conference held in France in 2015 (WP6) will be a very good opportunity to disseminate information, especially to French potential stakeholders.