

Global District Energy Climate Awards

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Heating network of Melun - Paris region, FRANCE

Concession grantor:

Communauté d'Agglomération Melun Val-de-Seine, FRANCE

Concession holder:

STHAL (Société Thermique de l'Almont), a Dalkia France subsidiary
Founded in 1971

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A geothermal heating network that's growing with its town



STHAL (Société Thermique de l'Almont) is a geothermal heating network which supplies over 6,000 equivalent housing units in the northern sectors of the town of Melun, located in the south-eastern suburbs of Paris. When created 40 years ago the network was the first of its kind in France, and it has grown and evolved over the years. This evolution has a strong technological component. A new well (the third) of composite fibre was sunk in 1995, and was the first of its kind in Ile-de-France. The network has now been linked up with an existing heating network allowing its coal-fired boiler to be closed down, and in 2010, it was extended over a 1-kilometre

pipeline to connect with the waste incineration centre of Vaux-le-Pénil. This additional power means over 50% of the network's heating will come from renewable energy sources, despite some major developments in Melun, including an eco-neighbourhood and a hospital. Despite 40% expansion in its area of service, renewable or "unavoidable" energy will now account for 66% of the network's output. Naturally, geothermal energy will remain the basic energy source of the future configuration of the STHAL network, but the prospects of offering subscribers not one but several alternative energies marks a new stage in the development of urban heating.

Dalkia and Communauté d'Agglomération de Melun Val-de-Seine are proud to present this project for "expansion of a municipal scheme with more than 10,000 users" at the 2nd Global District Energy Climate Awards.

→ Description of the project (max. 10 pages)

4.1. Background



Île Saint Etienne - MELUN

Melun is a town in Ile-de-France, the region which produces 80% of France's geothermal energy. Over 150,000 equivalent housing units are served by this method of heating, which saves over 100,000 tonnes of oil equivalent per year.

A university town with 39,000 inhabitants, Melun lies on a bend in the Seine 40 km south-east of Paris. It occupies an area of around 800 ha.

The **STHAL network** was created in 1969 to supply the northern quarters of Melun. At the time, using geothermal energy to power a heating network was a totally original idea. In fact, it was the first time geothermal energy had been used to power a heating network in France.



Melun uses the same geothermal source for heating and for domestic hot water, which are supplied over separate networks. This system makes Melun a unique network, and it supplies 4,000 housing units and 2,000 equivalent housing units of public buildings. In most cases, heating and hot water are supplied over a common network and are separated at substations located outside the buildings they serve.

The water is pumped from the Dogger aquifer. This water, located at a depth of between 1,800 and 2,000 metres, is mildly corrosive. The original system was a doublet, with one production well and one injection well giving a geothermal output of $100 \text{ m}^3/\text{h}$. The temperature of the pumped water is 72°C .

The network was boosted in 1989 with the construction of a third well to replace the original injection well, which had become blocked due to corrosion problems. Output increased to $130 \text{ m}^3/\text{h}$.

THE NETWORK IN FIGURES

Production plant:

- subscribed demand: 25 MW
- installed capacity: 39 MW

with:

1/ Almont boiler: geothermal power: 8 MW

- one 9 5/8" diameter production well in composite resin tubing
- one 9 5/8" injection well with steel casing
- corrosion inhibitor injection station

2/ Almont boiler: cogeneration: 5 MW heat and 4 MW electricity (2 gas motors)

3/ Montaigu boiler: back-up/emergency gas-powered boiler (24 MW)

Distribution:

- one network of 10 km
- 48 secondary substations located in buildings and 21 equipment substations

Annual production:

- 6,500 equivalent housing units supplied
- 70,000 MWh heating energy produced per year
- 140,000 m³ of domestic hot water produced per year

Energy basket at present:

- Geothermal: 63%
- Cogeneration: 25%
- Natural gas: 12%



The local geothermal network has always been an influential factor in urban development projects in Melun.

When the town began redeveloping its northern quarters (where 60% of its inhabitants live) in 2008, the urban heating network was naturally an integral part of the project.

● Créer une ville durable et respectueuse de l'environnement L'éco-quartier

La Plaine de Montaigu, dont les travaux démarrent en 2011, constitue le dernier territoire urbanisable de Melun. L'enjeu du futur éco-quartier est d'offrir un nouvel équilibre urbain à la ville.

Source de liens et de nouveaux échanges, cet espace se doit d'être exemplaire à tous les niveaux, tant en termes de préservation et transmission du patrimoine que de vie quotidienne. Pour permettre ce rayonnement, l'humain est au centre des réflexions concernant l'offre d'habitat proposée (2 000 logements). Ceci se traduit entre autres par une démarche d'écologie urbaine globale, notamment via l'Approche Environnementale de l'Urbanisme (AEU), la mise en place d'un corridor écologique et un travail approfondi sur le plan-masse général du futur éco-quartier. Ainsi, pour les Melunais, c'est l'instauration d'une réelle mixité sociale et fonctionnelle

d'une gestion raisonnée des ressources et des rejets. L'objectif final est de développer une conception innovante et ambitieuse de l'aménagement urbain en s'inscrivant dans une logique durable quant à la protection de l'environnement, de la faune et de la flore.

Le futur éco-quartier proposera :

Un pôle culturel basé sur les loisirs, l'apprentissage et la création, mêlant domaines artistiques alternatifs et plus conventionnels **un parc des sports** proposant une offre diversifiée pour les habitants et les enfants des écoles

Un parc urbain accueillant l'ensemble des équipements publics et de proximité et privilégiant les modes de déplacements doux

Un parc floral et végétal conciliant nature au quotidien et respect de l'écologie locale **2 000 logements** (logements sociaux, privés, en accession sociale à la propriété...)

La ville de Melun a reçu le prix mérito environnement remis par le National Geographic, partenaire du MEEDDM (Ministère de l'Écologie, de l'Énergie, du Développement durable et de la Mer) et du Muséum National d'Histoire Naturelle, pour sa démarche innovante.



Afin de favoriser le tri sélectif et la réduction des coûts et, en lien avec le SMITOM (Syndicat Mixte en charge du traitement des déchets sur l'agglomération) la ville de Melun souhaite développer une offre nouvelle en

terme de gestion de la collecte via la mise en place de conteneurs semi enterrés et enterrés. Cette nouvelle organisation sera mise en place sur l'éco-quartier avec en projet l'ensemble du territoire melunais.

- 2009 Révision simplifiée des documents d'urbanisme
- 2010 Définition du schéma d'organisation
- 2010 Consultation et désignation de l'aménageur
- 2011 Premières constructions
- 2012 Premiers grands travaux relatifs aux infrastructures routières (déviations, boulevard urbain...)
- 2013 - 2020 Aboutissement du projet d'aménagement de l'éco-quartier de la Plaine de Montaigu



«La ville n'est pas une simple agglomération d'hommes et d'équipements, c'est un état d'esprit»
Robert Park

● Développer l'innovation et l'accès aux soins Le pôle de santé et le nanopôle

D'ici quatre ans, un pôle de santé d'envergure régionale ouvrira ses portes sur la butte Beauregard.

Le projet a pour objectif la reconstruction de l'actuel Centre Hospitalier Marc Jacquet en s'appuyant sur un partenariat avec la clinique privée «les Fontaines».

Chaque établissement conservera son autonomie. Ce regroupement permettra l'amélioration de l'offre de soins proposée à la population en mutualisant les compétences de chaque structure.

Les objectifs environnementaux feront partie intégrante de cette programmation sur l'ensemble du Projet Urbain «Oxygène».

En lien avec le futur pôle santé et afin de favoriser l'innovation et la recherche, la ville de Melun envisage d'implanter au sud de la butte Beauregard, un pôle d'excellence autour des nanotechnologies et des biotechnologies dont les objectifs sont de :

Concilier recherche médicale, innovation et économie.

Favoriser l'implantation d'activités à haut contenu technologique.

Créer des liens actifs avec la recherche et le savoir universitaire.

Imaginer un pôle d'entreprises et de services ayant un fort potentiel d'innovation : Biopark, Genopole...



«On n'attend pas l'avenir comme on attend un train. L'avenir on le fait»
Georges BERNANOS

Le Pôle de Santé en chiffres

Hôpital Marc Jacquet

- Surface : 60 000 m²
- 700 lits
- 1000 places de parking

Clinique des Fontaines

- Surface : 14 000 m²
- 185 lits et places
- 200 places de parking

Les services extérieurs communs

- 1 institut de formation en soins infirmiers
- 1 crèche destinée au personnel du pôle santé



- 1^{er} trimestre 2010 Phase de concours (désignation groupement conception - réalisation)
- Avril 2010 Dépôt du permis de construire
- Début 2011 Début des travaux
- Fin 2013 - début 2014 Fin des travaux et livraison

Le concours de conception réalisation est lancé et les premiers résultats seront connus au printemps 2010.

les fontaines
CLINIQUE



Pages from the prospectus for OXYGENE, the urban redevelopment project of the town of MELUN

The 2,000 housing units of the Montaigu eco-neighbourhood and a new 700-bed hospital are due to be connected to the network in the coming years, thanks to the constant commitment of a municipal council which considers the network to be a valuable community asset.

The heating and hot water needs of the new developments will require an additional source of alternative energy to ensure a constant renewable energy rate of over 50%, which keeps the network in the reduced VAT band.

Additional heat energy will be provided by the waste incineration plant of Vaux-le-Pénil. A pipeline 1 kilometre long will be laid to connect the boiler to the waste incineration plant. Once an exchanger has been installed at the plant, it will be able to supply the network with the additional heat it needs. Which gives us good reason to be optimistic, for the renewable/unavoidable energy component of the network will rise to 66% despite a 40% expansion in the area it serves.



Naturally, geothermal energy will remain the basic energy source of the future configuration of the STHAL network, but the prospects of offering subscribers not one but several alternative energies marks a new stage in the development of urban heating in Melun.

Three questions for Renée Wojeik, deputy mayoress of Melun, 1st^{vice}-president of the Communauté d'Agglomération Melun Val-de-Seine and supervisor of the urban heating contract for Melun l'Almont

How do you view geothermal energy in Melun?

Geothermal energy has had nothing but positive consequences for the town of Melun. Look at the figures: it supplies over 6,000 dwellings with hot water and heating. Geothermal energy protects local inhabitants against fluctuations in fossil fuel prices. It now serves 30% of the inhabitants of Melun. Many of these belong to the poorer strata of society, and they receive an exceptionally good quality of service at a cost which doesn't change. Yes, geothermal energy is a source of pride for the local administration.

What's the future for a geothermal network in a town like Melun?

The geothermal network is constantly growing. Over the last 3 years, we've connected over 750 housing units - new or existing - to the network. And there are some ambitious plans for the future: we plan to connect 2,000 housing units in the new eco-neighbourhood near Montaigu, and the new hospital in 2014.

How do you explain the success of the network?

One reason is that local representatives have been passionately committed to the project right from the outset. When it was launched 40 years ago, this project was well ahead of its time! For Melun, a competitive geothermal network like ours is a source of pride.

4.2 A summary of the network's history and technical data

Back in 1969, the municipal council of Melun awarded STHAL the contract for the operation and management of a public heating distribution network in the town's Almont and Mézereaux neighbourhoods. Originally, the network was powered by a central boiler complex combining traditional heat production installations with geothermal installations.

Nearby, the low-cost housing office (OPDHLM) of Seine-et-Marne had been supplying homes in the Montaigu neighbourhood with heating via a coal-powered boiler since 1966.

In 1977, in its endeavours to improve its housing stock, and after feasibility studies had shown that the various parties involved stood to make financial savings, the OPDHLM decided, along with the town of Melun, to connect its network to the municipal heating network in the neighbourhood of Almont.

In 1998, the Montaigu neighbourhood was connected to the network, which was then reinforced with the addition of a cogeneration plant.
At present, STHAL supplies heating and hot water to the equivalent of 5,715 housing units, with annual consumption of 71,905 MWsch.

The distribution network covers 10 km, with 48 residential secondary substations and 21 equipment substations.

The production equipment is located in two interconnected boiler plants:

- Almont boiler: Geothermal energy (220m³/h - 71°C) & cogeneration (2 x 2,550 kWth),
- Montaigu boiler: 2 x gas generators (24 MW) and 2 x coal generators (15 MW, back-up).

4.3. The next stage: connecting the heating network to a nearby incineration plant



Since summer 2010, the network has been connected to the domestic waste incineration facility at Vaux-le-Pénil. The new project allows added exploitation of the heat and electricity produced in the network, and enables it to expand while operating with over 50% renewable energy.

Over €1 million were spent on the connection and €5 million on the network.

Renewable/unavoidable energy rose from 63% to 90% of the network's output.

There were also financial reasons for the expansion, as it allowed the network to continue qualifying for beneficial VAT rates of 5.5% - which means significant reductions to subscribers' energy bills.

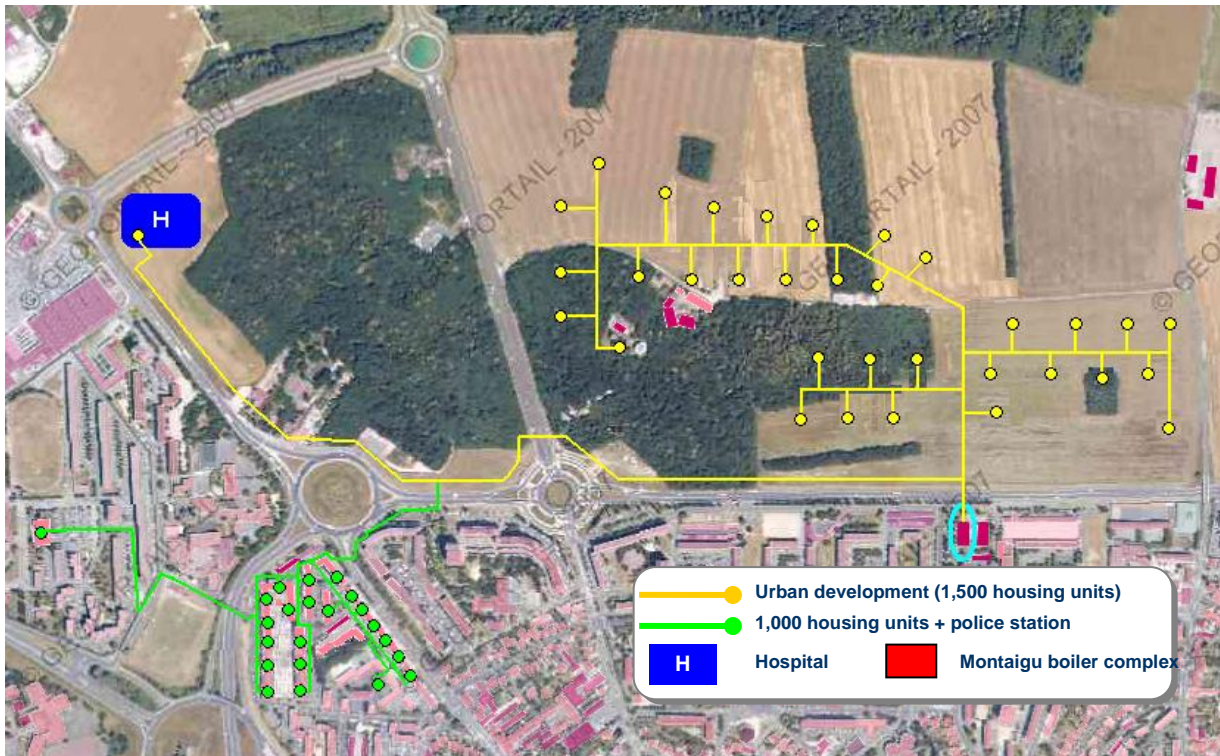
Decisive factors:

- **Significant urban development** in the area of the network:
 - The new hospital of Melun (700 beds)
 - The Montaigne eco-neighbourhood (2,000 housing units)=> 10 MW power requirements and 30,000 MWh energy requirements
- **The town's wish** to meet additional energy requirements via its heating network
- **The need to find an additional renewable energy source alongside geothermal** to keep the network's renewable energy component > 50% to qualify for 5.5% VAT
- **End of cogeneration contract:** 31 October 2010
- **The same global costs for users**

4.3.1) Extent of the network

Development potential

A new urban development and a hospital are to be built in the northern district of Melun in 2012-2013. This will enable the network to be extended westwards to serve 1,000 existing housing units plus a police station and school.



* From the development plan for Plaine de Montaigu

The development of its northern quarters (as part of the Plaine de Montaigu urban redevelopment project) is a priority for the town of Melun. The project involves the development of the last remaining available land in the town and will significantly increase the town's population. On completion, the new housing quarter will comprise 1,500 new housing units in a new and diversified residential offering.

Articulation of the new neighbourhood with the urban redevelopment project will involve the rehabilitation of over 100 social housing units.

An urban development project of this scale will allow the municipal administration to implement new practices in sustainable development with high environmental quality. The development guidelines will oblige future promoters to take environmental criteria into account.

And the creation of an all-new neighbourhood will allow the necessary public and private facilities to be created.



Forecast energy consumption is as follows:

Montaigu urban development zone: 16,000 MWh/year (output power = 7MW)

- Housing: 1,500 units
- Public facilities

Hospital: 13,100 MWh/year (output power = 6 MW)

- Estimated surface area: 76,000 m²
- 680 beds

Existing buildings: 21,690 MWh/year (output power = 12.8 MW)

- Police station: 5,700 MWh/year (output power 6 MW)
- Urban development zone - 1,000 housing units: 14,100 MWh/year (output power = 6 MW)
- Secondary school: 1,890 MWh/year (output power 800 kW)

We estimate power consumption will be +50,790 MWh/year at delivery points, i.e. +54,615 MWhsch/year leaving the boilers.

4.3.2) Choice of the waste incineration plant

GENERIS: contractor for management of domestic waste treatment and recycling as part of a public service contract. This contract includes the management and operation of the domestic waste incineration plant at Vaux-le-Pénil, the property of S.M.I.T.O.M.

Key figures:

- Treats waste produced by 300,000 inhabitants
- Serves 27 municipalities
- 140,000 tonnes of domestic waste treated per year
- Generates 80,000 MWh of electricity per year

Plant:

- Steam generator (52 tonnes/h at 42 bars)
- 2 incineration furnaces > 850°C
- Turbine + alternator

Reasons for the project:

Melun's urban heating network is a public service operated under contract by STHAL and is primarily powered by geothermal energy. Since the network uses a renewable energy source in a proportion over 50%, under French legislation (law no. 2006-872 of 13 July 2006) the buildings served by the network qualify for special tax relief, paying only 5.5% VAT on their heating bills.

As the environment is now a major issue, the municipal authorities wish to further develop this inexpensive and eco-friendly method of heating.

A new urban development (ZAC Montaigu) and a hospital are to be built in the northern district of Melun in 2012-2013. These developments will require an additional source of renewable energy to keep the renewable/recovered energy component above 50% in the long term.

And in March 2010, the electricity purchase contract for power produced by the cogeneration plant currently in service at the Almont boiler complex will come to an end. A new source of energy has to be found before October 2010.

To meet these challenges, the heating network will be connected to the SMITOM domestic waste incineration facility (Vaux-le-Pénil) which will provide "recycled" thermal energy (i.e. the heat generated by incineration), which qualifies as renewable energy.

The economic benefits for the users:

Connection of the Vaux-le-Pénil facility to the urban heating network of Melun will permit:

- continued highly competitive heating costs for subscribers to the network,
- long-term qualification for the 5.5% VAT rate,
- reduced fluctuations in costs via significant reductions in the use of fossil fuels.

4.3.3) Cogeneration

Cogeneration previously met 25% of heating needs. With the connection to the waste incineration facility and the extension of the network, cogeneration will now meet only 14% of heating requirements. STHAL bears 100% liability for the risks involved in cogeneration and is also responsible for the associated CO₂ quotas (Almont).

4.3.4) Funding

The new connection between the Almont boiler complex and the waste incineration facility is 100% funded by STHAL and ADEME/Regional Council subsidies. It will ensure that the heating network continues to qualify for 5.5% VAT. STHAL will also finance the extension of the main network to cover the Montaigu urban development zone and the hospital.

4.3.5) Environmental benefits

By adding recycled energy to the energy mix, the connection to the waste incineration plant will increase the environmental benefits already provided by the network. **90% of heating needs** will now be covered by the combined geothermal network (65%) and waste incineration facility (25%) against 63% before the link-up.

4.3.6) The energy mix after extension

Geothermal: 51%

Domestic waste incineration: 15%

Cogeneration: 14%

Gas: 20%