



Sequence 5: Geothermal energy



Fiches de synthèse mobilisée (collection en français) :

- Fiche n°13 Terminale PCM : Transferts électriques d'énergie



Sommaire des activités ETLV :

- ACTIVITY 1: Geothermal energy video (level 1)
- ACTIVITY 2: Geothermal energy (level 2)

Layout of the sequence

1. Activity 1: Introduction (5 min). Watching a video and finding vocabulary (20 min).
2. Activity 2: Questions and answers (10 min).

ACTIVITY 1: Geothermal energy video (level 1)

Objective: Acquiring information on geothermal energy



DOCUMENT 1: ENGIE Solutions : The Geodals District Heating Network, the energy transition of Dammarie-les-Lys



https://www.youtube.com/watch?v=2usmZ7_4Pdc

Source: ENGIE solution

The Amarillis thermal power plant, located near Paris, utilizes production and reinjection wells to exploit high-temperature thermal water, treated with corrosion inhibitors to prevent damage. It also includes a combustion plant with natural gas boilers and is monitored by a maintenance team through supervision software to ensure efficient operation of the distribution network.

■ **Gathering information:**

Listen to the video carefully. Write down the keywords/expressions/definitions you heard on a piece of paper.

■ **Acquiring vocabulary:**

Fill in the blanks:

English	French
Thermal power plant	
Wellhead	



Deviated boreholes	
Porous limestone	
Corrosion inhibitor	
Submersible pump	
(Plate) heat exchangers	
Metering pump	

■ Going into details:

Watch to the video and find the missing words (numbered from 1 to 10):

Welcome to the third thermal power plant of the Dammarie-les-Lys located in the southeast of Paris; 45 kilometres from Paris. Here we are on the well heads area. As you can see, there are two wells, one for production and one for re-injection. Here, in Dammarie-les-Lys, the temperature of the thermal water is 71 °C on production and reinjection is around 40-45 °C.

In Paris area, the reservoir used is called the (1). It's located between 1.5 and 2 kilometres deep.

It's a porous limestone, full of (2). As you can see, the production well and the re-injection well are near to each other on the surface. But in the reservoir, in the dogger, they are about 1.5 kilometres from each other.

This is achieved by implementing deviated (3) during the drilling process.

Now to see the geothermal production well, I invite you to go downstairs. This is the production well. Geothermal water is chemically dangerous. It contains (4), particles of matter and it's very corrosive. In order to avoid corrosion, a corrosion inhibitor is used and injected at the bottom of the well through this pipe.

Also, to extract geothermal water, a submersible (5) is used. It's an electrical pump located in the pumping chamber about 250 meters deep. Now we are inside the geothermal power plant of Dammarie-les-Lys. Here, there are two water loops: one water loop is the geothermal water loop, and the other is the district heating network water loop. Let's see the geothermal water loop. Here, geothermal water is full of particles of matter. In order to avoid to clog the plate heat exchangers, a (6) process is used; a cyclonic filtration process.

Then, we have the heat plate exchangers, two heat plate exchangers of six megawatts each, and the re-ejection pump, because geothermal water is sent back into the (7) of the dogger. Geothermal water is very corrosive, so in order to avoid corrosion, a metering pump is used with the inhibitor corrosion product stored in this tank. Here are the two heat plate exchangers of the “geothermie” of Dammarie-les-Lys.

The district heating network of Dammarie-les-Lys is four thousand (8). The geothermal power is 12 megawatts. Now we are inside the combustion plant of Dammarie-les-Lys. Here, the energy from the geothermal water comes in and is dispatched through the district heating network. If needed, an additional power is available with these two natural gas (9) of 10 megawatts each.

The sound you can hear is the sound of the district heating network pumps. The district heating network of Dammarie-les-Lys represents 4000 households. One of the tasks of the operation on maintenance team is to monitor the district heating network. With this supervision (10), an operator can have access to all data on and information coming from the resource thermal power plant, the substations and the combustion power plant. I can also have access to a map of the district heating network of Dammarie-les-Lys and, for example, checking one of the substations of Dammarie-les-Lys.

This is a classical design with heat exchanger for hot water, and heat exchanger for heating in a substation.

■ Write your answers in a Google Form or below:



1. _____	2. _____
3. _____	4. _____
5. _____	6. _____
7. _____	8. _____
9. _____	10. _____

ACTIVITY 2: Geothermal energy (level 2)

Objective: Reinvesting vocabulary to increase your knowledge on geothermal energy

Answer the following questions. At the end of the lesson, the results will be presented to the rest of the class.

a) Where is the third thermal power plant of Dammarie-les-Lys located?

b) How many wells are there at the site, and what are their purposes?

c) What is the temperature of the thermal water at production and re-injection?

d) Why is a corrosion inhibitor used in the geothermal production well?

e) Which additional power sources are available at the Dammarie-les-Lys plant if needed?



Activities summary

What you must remember:

- **Geothermal energy**
- **Heat exchanger**
- **Power plant**

Skills linked to the curriculum:

Compétences	Capacités à maîtriser	Où dans cette séquence ?
APP	Utiliser du vocabulaire spécifique	Activités 1 et 2
	Lire et comprendre des documents scientifiques	Activités 1 et 2
COM	S'exprimer à l'écrit et à l'oral en utilisant le vocabulaire adapté	Activités 1 à 2

Objectifs de la séance :

- *Compétences linguistiques* : Améliorer la capacité des élèves à parler en anglais sur un sujet technique.
- *Compétences techniques* : Renforcer les connaissances sur la géothermie et le chauffage urbain.
- *Compétences de présentation* : Développer les compétences en communication et présentation en anglais.

Durée de la séance : 1 heure

Matériel nécessaire :

- Support visuel (vidéo courte).
- Accès à internet (pour recherches rapides si nécessaire notamment un Google form)