

green house areas have a great potential for the use of geothermal energy. For housing areas on the other hand the potential of the so called closed – heat cold storage should be considered. There is only a small area in the region allowed by the province of South Holland for windmills. The use of solar panels, also in combination with other sustainable energy sources, should not be forgotten.

From the map the following conclusions can be drawn:

1. Because of the high-energy demand the (planned) greenhouse areas are best suitable for geothermal sources. Because a geothermal source has a big energy output an energy web can be created between green houses, housing and/ or industry
2. The relative shallow phreatic aquifer (0 – 60 meters deep) in most of the region is reserved for small (closed) heat cold storage systems and other subsoil use. The deeper phreatic aquifer (60 meters and deeper) can be used by the bigger heat cold storage systems.
3. Smaller (closed) heat cold storage is useful for residential areas; the bigger systems (open) for industrial areas, offices, hospitals etc..
4. Solar energy is a good option in the existing residential areas.
5. The larger windmills are allowed in one area in the municipality of Waddinxveen. Smaller windmills are allowed in more areas, but are not always adequate for the energy demand of the total residential development area.
6. A combination of heat cold storage and solar panels is a very good way to reach higher sustainability aims.

The Manual

Note that the energy potential map (mentioned before) indicates potentials and preferences, but that every project is different. Other alternatives than indicated on the map may be preferable. That is also why a six phases approach is developed and described in the manual to be used by spatial planners to stimulate the use of sustainable energy sources.

The six phases are:

- | | |
|---------------|---------------|
| 1. Initiative | 4. Execution |
| 2. Research | 5. Managing |
| 3. Planning | 6. Demolition |

1. Initiative

In this phase the different spatial options for an area are defined. The following tips are given:

- a. Define the ambition to use sustainable energy sources for a certain, reasonable percentage, but do not be too specific on the energy sources that should be used. The exact details will be completed in a later phase.
- b. Realise that there are many financing methods. Financing by using “the total cost of ownership” creates other possibilities than the usual financing methods. Also in other phases a different way of financing can lead to new and more sustainable solutions.
- c. Try to involve the property developers, future users and other stakeholders in a very early phase and make sure they have a fair possibility for input. Ideally the plan is developed by all stakeholders.
- d. Make possible that investment costs can be passed on to the operator (for example by organising the developer and operator to be the same).
- e. Use instruments such as GPR, DPL, and BREEAM as tool for conversation and to show to what extent the project can be regarded sustainable.

2. Research

In this phase the feasibility of the spatial options defined in the initiative phase are examined. The following tips are given:

- a. Use a multidisciplinary approach. Try to involve all stakeholders and specialists that are important for the project. This will make sure that possibilities, changes, problems and solutions can be dealt with in an early stage.
- b. Think 3D instead of 2D.
- c. When making the ambitions concrete, try to keep options open for the end-users to make their own choices.
- d. Choose an approach in which first procedures and a variety of scenarios are focused on. Only then should the defined variants be checked against the available budget.

3. Planning

In this phase the chosen variant will be further developed. The following tips are given:

- a. Design a flexible plan to make sure that new techniques, that develop during the project, can be included in the development of the area.
- b. Organise communication and cooperation with all stakeholders throughout the whole process.
- c. Develop a co-operation agreement that elaborates on the different roles of the stakeholders and the financing methods.
- d. Think 3D and consider both the sub-soil and the surface. Heat cold storage can be profitable but may be incompatible with other plans in the area (both above and below surface)

4. Execution

In this phase the area is arranged and the constructions build. The following tips are given:

- a. Check upon a good delivery (possibly a performance guarantee) and reserve budget to solve (hidden) damages.
- b. Inform buyers on the potential of different sustainable energy sources and tell them about the advantages and disadvantages.
- c. Stimulate the use of sustainable energy sources by well-defined information sources in the early phases. Stimulate the knowledge and information not only within the civil service but also with other stakeholders such as the project developer, architect and the buyers.

5. Managing

In this phase agreements are evaluated and if necessary other agreements are made. When a heat cold system is installed choices should be made on the maintenance. The following tips are given:

- a. Make sure that in an early phase, after installing the sustainable energy source, someone is appointed to be responsible for the functioning of the system. Ideally the administrator and installer of the system are the same person.
- b. The administrator should be well reachable.

6. Demolition

- a. Know the law and demolish accordingly. Make sure that no (permanent) damage is done to the environment.
- b. Arrange as much recycling as possible.