Interreg North-West Europe cVPP

European Regional Development Fund

WP I1 | ACTIVITY I.3 | DELIVERABLE I1.3.1

INVESTMENT AND IMPLEMENTATION PLAN FOR ADDITONAL RES IN LOENEN

PARTNER RESPONSIBLE: FOUNDATION SUSTAINABLE PROJECTS LOENEN

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GENERAL INTRODUCTION

In report T1.3.1 various sources of RES are described with respect to their typical technical and financial properties. The feasibility of implementation of RES is not only a matter of these aspects, but also crucially depends on the availability of the renewable source (e.g. hydro power in the Netherlands with hardly mountains is not realistic). Next to that, supportive subsidy schemes, legal and permitting aspects, availability of space and last but not least, the voice of the local inhabitants are factors of great importance.

In this report, potential RES options for Loenen are selected and a plan for implementation is described. This is not a detailed feasibility study for a certain option or project. It is a non-project specific approach for the implementation of promising RES options in Loenen.

1 SITUATION IN LOENEN

The village of Loenen (3.200 inhabitants) is part of the municipality Apeldoorn, which consists of the city of Apeldoorn (150.000 inhabitants) and ten surrounding villages. The municipal centre of democratic power (city council, major) is located in the city Apeldoorn. In practice, a certain "distance" is therefore experienced between the city and the surrounding villages like Loenen.

This also counts for the energy policy: for the transition to a carbon neutral society, Apeldoorn is looking for solutions in the "backyard", in the relatively rural or less dense populated area around the city's borders.

In the selection of RES options elaborated below, the perspective is chosen in line with the cVPP project and related energy cooperative. What are the potential RES options that could be developed in own local initiative?

2 EVALUATION OF POTENTIAL FEASIBLE RES OPTIONS

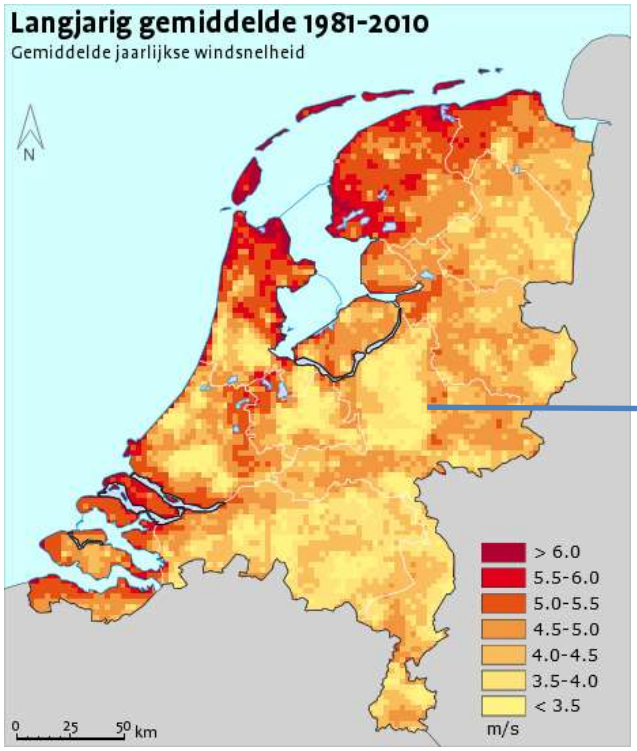
As described in report T1.3.1 there are many RES technologies available, each with its own characteristics. Here the RES options that could theoretically be feasible are evaluated qualitatively against the following criteria:

- Technical
- Legal
- Policy

- Financial
- Social

2.1 WIND

Although not ideal, the availability of wind in Loenen should be enough for modern, larger wind turbines to come to a feasible project. The number of potential sites is not that large, as the landscape is rather scattered and small scale in a mixture of urban, agriculture, industry and nature (forests). From the province, a contribution to the regional RES targets by the municipality of Apeldoorn is mandatory. Given the subsidy schemes and the fact that wind on land is financially rather feasible (although not so profitable as in western parts of the Netherlands, see windmap), the main factor to implement wind energy in Loenen will be a social one.



Long period year average wind speed (1981 – 2010)

2.2 PV SOLAR

From an availability perspective, the eastern part of the Netherlands is not as sunny as the coastal area, but the number of projects shows that PV is feasible with pay-back periods of about 7 to 8 years. Solar PV is also well known in Loenen, thanks to local initiatives as Loenen Energy Neutral. Estimated in October 2018 is that an amount of 1 MW of solar PV power has already been installed in Loenen. These solar panels are mainly installed on private houses, but also on the roofs of small enterprises. For this kind of applications, there are no legal restrictions or permits necessary. The policy of the province and the municipality is focussed towards

growth of solar PV. The potential for this growth in Loenen is available in residential, industrial and green field parks. This all could eventually lead to Loenen being an exporter of electricity, after covering its own consumption.

For large solar green field projects, social support will probably not be natural in Loenen, as these kind of projects have impact on the relatively rural landscape.

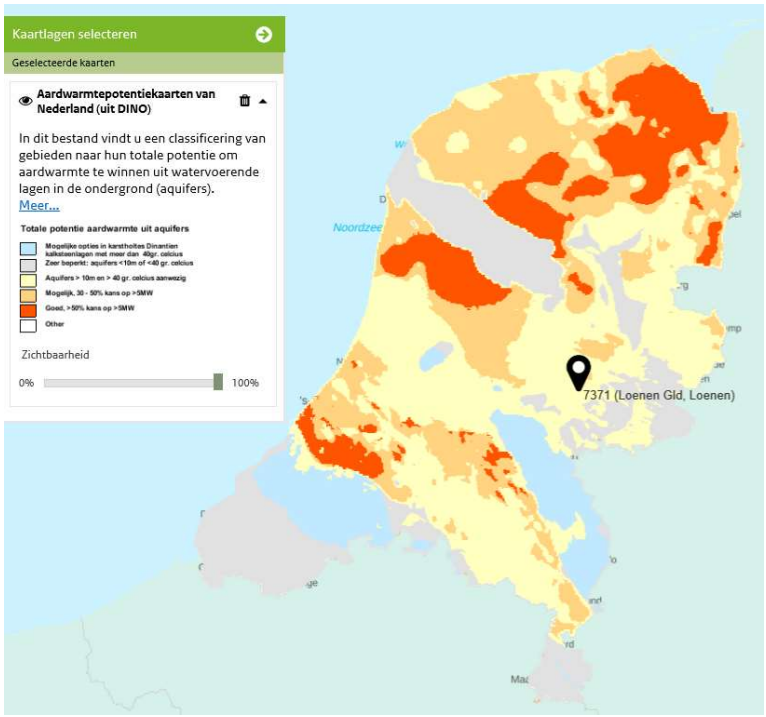
Solar radiation in kWh/year/m2

2.3 BIOMASS

Biomass can be applied in two ways. The direct way is burning it, as often is done with wood coming from the forest- or wood using- industry or public green maintenance. The heat that is generated is used in a district heating system for the built environment. The other way is fermentation of agricultural waste (e.g. manure from cows or remaining crop material) from which heat could be captured or the converted methane could be used as bio gas, or upgraded to green gas in the gas system. Green gas can (partially) be used as an alternative heating fuel to the natural gas from the Groningen gas field. Both sources are available in Loenen (large forest area and several cow farms). These applications are supported by the governing policy. From a cost perspective, these options are more expensive, also very much depending on scale. For a biomass heat system, a costly distribution system is necessary. Loenen is not built in high density, so costs will be relatively high for such a network. From a social point of view, these options will probably not face large objections.

2.4 GEOTHERMAL

In theory geothermal heath could be a sustainable generation source for Loenen. However, in the time frame of this project, it will not be a feasible application given the limited experience and technical issues to be solved. Also, the currently known potential is not in the high ranks (pls see map "nationale energieatlas" below). Risks and costs will therefore, as being evaluated now, be too high for local small-scale applications. Consequently, this RES will not be considered now, but future developments will be monitored. Also for this option a district heating system would need to be build in a relatively exetnsively built area.



Geothermal potential in the Netherlands

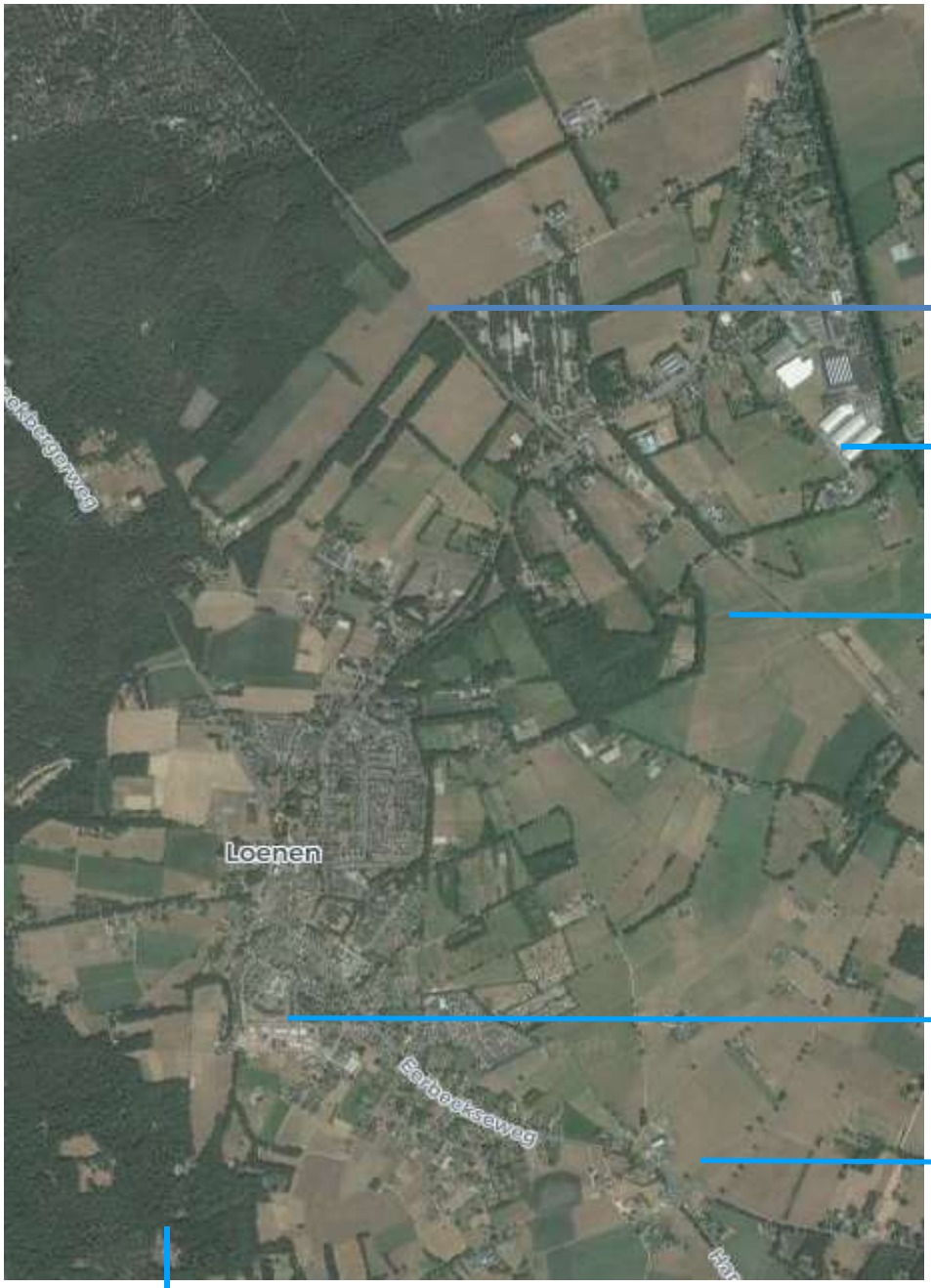
3 IMPLEMENTATION PLAN OF SELECTED OPTIONS

3.1 GENERAL OVERVIEW

As described above, feasible options for more RES deployment in Loenen will be solar PV, wind energy and biomass. In this chapter, options that are known and fit to this community-based project will be further elaborated. Aspects like development, finance- and organizational- options will be described.

The intention is to use the Energy Cooperative Loenen (founded in February 2019) for development and exploitation of new local larger scale RES, financed and supported by its members and other local stakeholders.

The picture on the next page shows typically potential of RES implementation in Loenen.



Windmills location selected by the municipality

PV on large industrial roofs

Possible PV on green field

Decentral PV on houses and sme

Biomass from cattle (20

Biomass from the forest

Remark: indicated locations are chosen randomly and typical examples and do not necessary indicate real development locations

4.2 CURRENT PROJECTS

In the table below a comprehensive overview of the RES implementation initiatives that are currently known, are listed.

Overview of currently known projects in any stage of development:

#	Name of initiative	Description	kW	Stage
1	Loenen Energie Neutraal	Non-profit revolving fund to stimulate citizens to invest in PV or heat pumps	Currently 1 MWp installed, will further increase (75 kWp/a)	Successfully active
2	SDE+ solar roof on industrial logistic buildings	Initiated through the Interreg c-VPP project as part of the expansion of RES	900 kWp	Engineering and finance phase, subsidy granted
3	SDE+ solar roof on industrial buildings of a packaging factory	Initiated through the Interreg c-VPP project as part of the expansion of RES	500 kWp	Subsidy application under evaluation
4	SDE+ solar roof on the new to build steam locomotive warehouse	Initiated through the Interreg c-VPP project as part of the expansion of RES	325 – 650 500 kWp	In permitting phase of new building. Next phase subsidy application
5	SDE+ solar roof on an existing SME building	Initiated through the Interreg c-VPP project as part of the expansion of RES	50 kWp	Subsidy application under evaluation
6	Several ground bound PV parks	1 – 15 MWp parks (5)	Total 30 MWp (?)	Initiative phase, not yet concrete

7	Municipality of Apeldoorn, wind survey	2 windmills of 3 MW each in Loenen ?	6 MW	Check of potential locations
8	Bio/green gas from local farmers	Green gas from naure digestion	500.000 m3/a?	First analysis

Target within the Interreg c-VPP project is to increase the RES base with at least 500 kW. This will be achieved if at least one of the projects #2 - #4 will be realized.

4.3 PLAN TO REALIZE THE INITIATED PROJECTS

The plan to come to realization of the already initiated projects consists of five main pillars:

1. Energy Cooperative Loenen U.A. as the project owner
2. SDE+ subsidy application must be granted
3. When granted, feasibility must be further explored
4. Project finance must be developed and secured
5. Project realization and operation of the asset

In Deliverable I1.3.2 "Feasibility study for additional RES" the concrete project #2 (table above) is further elaborated and detailed (please see also paragraph 4.4)

4.3.1 SDE+ subsidy application must be granted

After submitting an application for an SDE+ subsidy, it will take about three months (and sometimes longer) to learn if the application will be granted. As soon as this is the case, there is a period of 1 ½ year to realize the project. This might seem long, but in this period of time, many issues in project development have to be further explored and initiated.

4.3.2 Further substantiation of the business case

In case there is a positive decision on the subsidy application, the business case can be further finetuned. In case of a PV system mounted on a roof, engineering calculations must be made to secure the roof can bear the additional weight of the system. Costs need to be made more accurate, including the costs for the grid connection and the actual PV prices, so the LCOE (please refer to T1.3.1 for further explanation) can be determined. In parallel, potential suppliers for the installation can be selected. When all indicators are positive, the financing of the project needs to be completed. In this process, it is necessary to come to an agreement with the owner of the building/roof, if the roof is owned by another party. It must be clear to both parties on what conditions the PV system will be installed on the roof. Amongst the factors that need to be

included in this agreement are maintenance, rent, and a clear statement that the installation is not legally part of the building.

4.3.3 Project finance

Within the cVPP project, the aim is to implement an organizational structure for hosting the cVPP and other RES initiatives. This organizational structure will be an energy cooperative with the Loenen citizens as its members (please also refer to I.1.1.4). These members could participate in the SDE+ PV projects by buying certificates with a profit in return. The target is to raise at least about 25% to 30% of the investment sum of a project. The remaining amount will be a commercial loan at a bank. The bank will probably require a solid project set-up with risk limiting measures. Next to this, an electricity purchaser must be selected and a power purchase agreement must be closed.

4.3.4 Project realization

After securing the finance, the realization phase can start. This means a tender will be issued to a selected number of potential suppliers of the installation. Together with the selected supplier, a lay-out and system design will be made and the electrical system and grid connection needs to be realized. After installation, the asset is owned by the cooperative. A maintenance contract can be set up with the supplier.

As mentioned before, these steps have to take place in about a year time, which needs continuously effort and attention. Especially connection to the grid is an increasingly important crucial step, due to congestion.

4.4 ACTUAL PROJECT

An actual project that is being developed in the c-VPP project is a 900 kWp PV project on the large roofs of a complex of three logistics buildings of Thomassen Distribution Centre in Loenen (project #2 in the table). This project location has been granted a SDE+ subsidy for 15 years. The owner of the building has asked the Energy Cooperative Loenen U.A. to develop the project further as a community based initiative. At the moment of writing this report, the status is that there are three offers being evaluated of potential PV installation suppliers. Also the AC part of the installation, the AC cables and a new transformer including grid connection, are offered. Before this steps were taken, a thorough study of the strength of the roof construction was executed, in order to substantiate that the roofs are able to carry the extra weight of the PV-panels. This was confirmed.

In the Deliverables I1.3.2 and I1.3.3 the development and the role of thisporject in the c-VPP are further elaborated.

4.5 HORIZON

The projects that are listed in chapter 4.2 are part of the plan to reach “Loenen Energy Neutral”. This will be stimulated by the overarching “Klimaat akkoord” (Climate agreement on national level), which will trigger and force the municipalities to come with a strategy and action plans and stimulate commercial parties to develop new RES. Helpful in the Klimaat akkoord is that it is made mandatory that communities can

participate in RE-projects in their neighborhood. Apart from this, within Loenen there will be community-based initiatives, like within this project with the energy cooperative. Ideas to explore and develop are among others:

- Biomass based heat generation (direct or through green gas)
- H2 energy storage combined with PV
- Share system of electrical cars
- Roll out of residential heat pumps

5 CONCLUSION

In Loenen there is potential for a substantial capacity of new RES to at least reach the target of additional 500 kW as being part of the cVPP project. Current initiatives might add 2 MW of solar PV. The organizational structure has been set up in the form of an energy cooperative. In the near future, additional development of RES with the aim to generate heat, are on the planning. The project experience and organizational set up will then be in place.