



# **“Climate Related Energy Developments in the Netherlands”**

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Report for COMPLEX WP3, Deliverable 3.2, the Netherlands: Case Study Scoping Statement

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COMPLEX WP3

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Deliverable 3.2, the Netherlands: Case Study Scoping Statement

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Report for COMPLEX

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## 1. Overview of CRE Potential and Study Options in the Netherlands

The increased capacity to provide energy in climate friendly ways is an important step in mitigating future climactic changes. This scoping statement elaborates upon the research efforts that will be taken by the Dutch WP3 team to understand the implementation issues and opportunities related to current developments in the Netherlands with respect to climate related energies. This research will explore the feasibility of various policy options that can be used to reduce overall carbon emissions through changes to the energy supply in the context of the Netherlands. The spatial impacts related to the various energy options are considered to be an important variable guiding the assessment of the various developments. The three general variables considered when choosing the cases for this research are spatial impacts, the potential for energy generation at the national scale and multi-level societal/behavioural/economic barriers and supports to successful implementation processes.

The spatial impacts of implementing various climate related energies (CREs) are complex. Full attribution of spatial impacts is related to drawing connections of influence between the final product, the use thereof and all the actions that took place in order to implement it (including changes to existing infrastructure both public and private). The situation becomes more complicated when you begin to seek secondary or indirect effects of changes to the energy system. Further so, when you contemplate opportunity costs associated with choices made to address energy problems at a larger scale. Thus, it is important to clearly describe the scope of research and what will and will not be considered as a spatial impact of the energy related activities in order to choose the appropriate case study place, scale and scope. The importance of this becomes clear when we look at the potential for a number of various CRE's in the Netherlands. According to a recent Dutch Government planning agency document Space and Energy in the Netherlands (2013), the following types of renewable energy production have certain potential for energy provision in the Netherlands based on various considerations such as the current land use, social acceptability and economic implications: Biomass has an 800 PJ potential, Wind 500 PJ, Solar 300 PJ and Geothermal 200 PJ. Looking somewhat further into the data with an eye for spatial impacts, the high potential for Biomass is calculated based on a large majority of the biomass feed being imported from other countries (upwards of 80%). As a result, only approximately 160 PJ could result from Dutch based feedstock. A similar story is true of wind potential, with only 58 PJ expected as a possible maximum for land-based wind turbines (the majority of the rest to be located in the North Sea). Finally when we come to Solar and Geothermal, all of the expected potential generation would be generated on land (300 PJ and 200 PJ respectively). When taking these expectations into account, it is then Solar which is of the greatest interest related to domestic on-shore CRE potential.

Dutch domestic on-shore energy generation potential:

Solar: 300 PJ, Geothermal: 200 PJ, Biomass: 160 PJ, Wind 58 PJ – Total: 718 PJ

(adapted from: Van Hoorn and Matthijsen 2013)

Solar energy installments have the potential for both small and large scale development, can be privately or publicly generated and the land use change impacts can be significantly minimized by using existing roofs or otherwise flat man-made surfaces (340 km<sup>2</sup>). It is for this last reason currently considered to be a “winner” in terms of its acceptance by the Dutch population (Van Hoorn and Matthijsen 2013). In fact in 2012 the number of solar panels in the Netherlands experienced enormous growth due to local initiatives. In 2012 145 MW of new solar panels was installed, which is 3.5 times as much as in 2011. A large proportion of panels are bought by local joint citizen initiatives. Other related land-use or spatial impacts also develop related to solar such as energy storage requirements, transmissions, panel production, delivery, maintenance and installation, and behavioural changes based on the stakeholders and ownership agreements related to the installation.

Given that the Netherlands is an extremely densely populated country. The land that is available is generally heavily used for either industrial, residential, nature or agricultural purposes. As such, smaller scale initiatives that can be combined with other uses are proposed as being quite well suited to the context of the Netherlands. Smaller scale initiatives can be pursued either as individual efforts (from inhabitants or companies), or through local collectives. Many local solar or wind activities also take place as part of larger collective action. To include aspects of how the choices of households or individuals influence these activities we will work with WP5 where possible for sharing of information and ideas. Additionally WP4 will be consulted for opportunities to share information related to the role of uncertainty and asymmetric information related to decision making.

Following the rationale provided above, the Dutch WP3 team has chosen to work with Dutch local solar energy projects as a pilot case. These will be researched through studying the current developments of local initiatives as they appear to be more successful than larger scale developments and to offer more potential in a densely populated country like the Netherlands. The results then are likely to be most applicable outside the Netherlands to regions that are more developed, though in principle could apply to any area where land use change from green to grey is not desired and there is sufficient man made infrastructure upon which to place panels. Choosing for a decentralized and smaller scale approach to CRE generation can have the benefits of increased implementation speed since larger projects have bigger spatial impacts, and projects with high spatial impacts are slow to develop in the Netherlands due to strict planning regulations and a general culture timid of changes in land use (except in the case where changes are required for flood safety, in which case the high level of public acceptance can slightly speed up the necessary processes).

The choice of solar energy as the initial case, offers the opportunity to increase the comparability across cases of successful implementation since there are quite a number of different installations taking place under various contexts. The potential for co-benefits are high in cases where the projects are community driven and they are spread across different members of society. Additionally, there is research suggesting that when local residents participate in energy production they become more aware of their own energy use and this results in reduced energy consumption (which further supports the climate mitigation potential from implementation of this technology).

The land use impacts are expected to be quite limited through this type of energy development (both through reduced consumption – thus demand – and overlapping with other already in tact functions

that are commonly agreed to by local stakeholders). This is not only expected in the sense of limiting the area of land use change, but also in the sense that “spatial misfits” with the characteristics of the place of implementation, like the ecology, the boundaries, the function and the values attached to the place, are less likely to occur (Kotzebue, 2012). The extent to which minimizing land use impacts related to a transition to increased renewable energy supply can be achieved through solar energy development is thus a major contribution of this research. Following the pilot research on solar projects we will switch our focus to wind and biomass, given that these are the next two important CRE choices with potential land use impacts in the Netherlands (geothermal is seen to have minimal above ground land use impacts and is thus not included in this research). The choice of these three options will allow us to observe the differences in land use associated with these three different technologies and their potential for energy production in the Netherlands. The following hypothesis are made to be supported through the three phases of research:

**Phase 1 Research:** (Pilot) Decentralized Solar - in the context of local SD efforts (low land use impact, high potential, low barriers from societal concerns)

**Phase 2 Research:** On-Land Wind - (medium potential, medium land use impact, high barriers from societal concerns)

**Phase 3 Research:** Domestically sourced Bio-mass; (high potential, med-high land use impact, medium barriers from societal concern)

These choices allow us to study how CRE’s can be achieved through minimally invasive impacts on land use, production potential related to various land use scenarios and barriers to implementation within the Dutch context.

The following research questions enable us to better understand a number of the interesting elements of these various CRE developments:

1. What types of informal and formal organizational and administrative bodies are involved and how do they support and hinder the development of the different CREs.
2. What kind of local or regional energy plans are in existence? How coherent are they with the project plans and what kind of collaboration is seen to develop?
3. What policies most heavily influence the successful implementation of CRE at the local level?
4. What local contextual factors seem to have an influence on the choice of local communities to implement CRE projects?
5. What stage are the various processes at?
6. What level of integration exists with other societal goals/projects? How often are local energy projects implemented alongside other sustainability oriented projects?
7. What spatial impacts are expected to occur if the policy or strategic goals are met?
8. What land use relationships can we identify that have led to CRE related land use changes in the past?

*Data requirements:*

Project overviews: The first initial scoping exercise about CRE potential revealed a breadth of general information about the current amount and expected future amounts of CRE production and use. This

data is available at the national and provincial scale and in some cases regional and municipal. One single up-to date database of all decentralized projects could not be found and is as such necessary to develop to the level of detail necessary to gain perspective of the major developments with respect to implementation issues and spatial effects. A lack of cartographic information related to the spatial and land use contexts is not likely to be an issue when attempting to incorporate the data into the land use software Metronamica). However many of the current activities are very recent and small scale and will not likely be included in the data found. This will be a task for the modelers in terms of scenario development. Activities will be categorized as local initiatives, small scale and large scale. Information related to the energy transmission infrastructure is also important since if all of the energy generation were to be electrified, then the infrastructure would need to change since currently so much is delivered via natural gas and other fossil fuels (see van Hoorn en Matthijsen 2013 p 10).

## 2 Dutch Energy Scoping Study

In order to determine the appropriate stakeholders and case study areas in the Dutch context of local energy initiatives, we have performed an initial scoping of energy transition policies and initiatives in the Netherlands and its provinces.

Following a long period of highly active involvement in the international environment and sustainable energy policy arena, the last decade has witnessed the Dutch government retreating from their prominent place in the list of countries perceived to be frontrunners (for further details see Appendix 1). While “negotiated agreements” were central stage in the nineties, that were (almost) binding depending on the way the monitoring and enforcement procedures were agreed in the text (Bressers a/o., 2011) present national policy consists of “Green deals” which are neo-liberal based successors of the previous system of environmental and energy covenants in which private investors need to participate and government largely just facilitates. The most recent cabinet has ambitions of achieving a level of 16% green energy production by 2020. This is a slight increase above previous targets.

A subsidy system, the Stimuleringsregeling Duurzame Energieproductie SDE+ (Stimulation subsidy sustainable energy production) was opened in March 2012 and the full budget of 1700 million Euro was used before the end of the year. Of this budget only 8 million was spent for 112 pure green electricity projects. The bulk of the support was spent on heat production in waste combustion (4 projects for 279 million), thermal conversion of biomass (4 projects for 204 million), extended operation of other thermal conversion (4 projects for 235 million) and 30 geothermal projects for no less than 829 million Euro (typically for the creation of energy neutral glasshouses and thereby supporting also that sector). For 2013 a new call is opened (Agentschap NL, 2012). This implies that the SDE+ support goes mainly to large scale initiatives.

The Netherlands has 12 provinces that all have in varying degrees policies to promote green energy. Some provinces have policy schemes to specifically support local initiatives, while others focus on the stimulation of energy companies to increase production of CREs. A number of Dutch provinces are using available general investment funds for these purposes, although even in those with fewer available funds, numerous local initiatives are creating a great deal of momentum that is supporting a general energy transition. Some provincial policies are not attuned towards local initiatives and in some instances large scale energy infrastructure developments still consume most of the provincial attention related to increasing CREs. The following is a summarized list per province of the major developments related to CRE policy implementation and development<sup>1</sup>.

Apart from the large scale initiatives there are also a large and quickly increasing number of local initiatives. These local initiatives are partly shown on the website of “HIER opgewekt” (<http://www.hieropgewekt.nl/initiatieven>) where the geographical position of some 300 initiatives is shown on an interactive map. Some 66 local initiatives are helping each other in the Duurzame

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<sup>1</sup> Please see Appendix 2 for a long list of the available web resources from which this information was summarized.

dorpen (sustainable villages) network (<http://www.netwerkduurzamedorpen.nl/>), also showing the geographical spread. The international network “Transition towns” has a Dutch branch (<http://transitiontowns.nl/>) that has one provincial and 83 local initiatives.

### *Province of Groningen*

The province of Groningen has one of the most productive natural gas fields of Western Europe. At its northern shoreline it borders with the Waddenzee, a nature area of European importance. However, near de Eems estuary a large industrial estate and harbour have been built where several new pieces of large scale (mainly fossil fuel based) energy infrastructure have been constructed. The province has a strong position as a gas hub that has heavily influenced the provincial government’s Energy Program 2012-2015 (approved December 20, 2011). In this program, the province aims to have 50 million cubic meters of “green gas” (improved biogas) fed into the natural gas system. It has contributed to developing and housing the “Energy Academy Europe” which provides education and support for energy research and start-ups. Offshore wind and smart energy distribution systems are also mentioned within the program. It sees itself, together with other northern provinces, as an “Energy Valley” (related to a “green deal” project for the north of the Netherlands) and an “Energy Port”. It wants to achieve a “sustainable energy situation” by 2050. While permits have been provided by the national government to construct new coal-fired electricity plants in the Eems-harbour area, the provincial government is not in favour and wants to increase support for local sustainable energy initiatives. However, while the provincial program states that it supports local initiatives and also one million of support is included in the budget, further programmatic attention could not be found. Currently there is only one project in the province of Groningen that is associated with the Duurzame dorpen initiative.

### *Province of Fryslân*

In the province of Fryslân, the documents surveyed suggest that the provincial government highly values cooperation with a wide array of organisations, including individual households and citizens. This is illustrated by the Sustainable Energy Program for 2009 – 2015 where it mentions its role as more of an enabler to ensure that the demand for sustainable energy is met by the supply. They set out 50MW as a goal for solar energy and state that already a new system is being set up that allows just 12 farmers to produce and distribute their manure as green gas to 25,000 households. The program is setup in a Doing – Daring – Dreaming scheme, which connects concrete measures via goals to an ultimate horizon of a fully sustainable and independent energy supply. Their strive for independence has been preceded by a similar ambition of the Dutch Waddenzee Islands (which all belong to Fryslân, except one - Texel). Energy independence provided by internal sustainable energy sources is seen as supportive for the “green image” of these islands, which rely heavily on tourism. In 2013 the province has begun to provide a subsidy that enables the start-up of a Frisian energy cooperation in which all Frisian citizens can take part. The cooperation aims to have more than 50.000 members within three years, which would enable it to invest 2 million Euros per year in green energy projects. The province of Fryslân has the largest concentration of members of the



“sustainable villages” network organization with a total of 43 different projects. A large proportion of these villages are undertaking sustainable energy projects.

#### *Province of Drenthe*

In the provincial energy program of 2012-2015 the preference for a high value “bio-based economy” is mentioned, implying that just using bio-based options for energy production might not be the best choice in the long run (like was also stated in the Social Economic Council advise). Nevertheless it is also aiming to produce 60 million cubic meters of green gas. Its policies generally align well with the Energy Valley perspective described to be in place in Groningen, as well as with the national targets. Drenthe wants to make its own “green deals” with partners to help them as well as facilitate their initiatives. In December 2011 they founded the “Drentse Energy Organisation” which uses revolving funds to enable additional growth in the production of sustainable energy. This organisation is deliberately placed outside the provincial organisation as an independent foundation ([drentseenergieorganisatie.nl](http://drentseenergieorganisatie.nl)). It sponsors initiatives from various types of organisations, based on the approval of the submitted business plan. The province has stated their preference for using designated areas in the eastern part of the province for the development of wind energy. This area is near the German border and has a landscape which is relatively open. A consultancy and engineering bureau, (which is connected to an international company) has recently attempted to hold a poll in the north of the province to see how many people would like to become self-sustained in green energy and subsequently guide these communities towards this goal. Relative to its small population the province has many local initiatives. It currently has 6 projects connected to the Duurzame dorpen initiative.

#### *Province of Overijssel*

In the years 2010 and 2011 the Province of Overijssel stimulated the development of 23 “sustainable village” concepts through a contest that provided coaching support as well as a budget from between 25,000 and 1,000,000 Euros. In its own provincial plan (Energy Pact Overijssel 2008: later in 2010 renamed Program New Energy, with a new elaboration in 2011) energy from bio-mass is seen as being the most promising option for green energy development (9 PJ expected to be available in 2015 and growing to 10% of all energy use in the province). Other forms of green energy are also mentioned although with far less ambition (geothermal at 1 PJ in 2015, wind at 1.1 PJ in 2020 and solar at 0.5 PJ in 2020). In the most recent elaboration of the Energy Pact the priority for bio-energy is very clearly stated. In 2011 an Investment Fund Sustainable Energy was founded which takes the form of a private investment company that has independent management and a capital base of 250 million Euros. This was donated by the province using the funds that have been set aside for investments of this type. Only in exceptional cases does the province participate in these projects. The stimulation of initiatives from companies or network organisations is the main goal of this fund. There are nine Duurzame dorpen initiatives listed in the network and also Transition Towns has an organization on the provincial level (though not active recently).

### *Province of Gelderland*

While Gelderland only has 6 initiatives registered as part of the Duurzame dorpen initiative, there are 29 local green energy initiatives that have been recognized by the knowledge platform named HIER Opgewekt ( translated as - Generated HERE). Per province, Gelderland hosts the largest number of projects that have been logged on their website. Another organization based out of Gelderland (Duurzaam Energie Gelderland) lists more than 50 local initiatives. This organization is a knowledge exchange platform that is referred to as a network for sustainable regional energy, is supported by the provincial government as part of its program “Learning for Sustainable Development” and it is also supported by the sub-provincial regions. In the Priority Program for Energy Transition of 2011 and Working with Our Own Energy 2012-2015 of 2012 the province emphasizes the importance of the Clean Tech sector for the climate and the economy through job creation and support for innovation. The approach is to mainly work with partners as a facilitator, though they also can direct and initiate activities. The state the importance of remaining adaptive in the rapidly changing context. It is explicitly stated that the energy transition is considered in all decision-making processes related to spatial planning and spatial quality in the province.

### *Province of Flevoland*

Flevoland is a province that is predominantly composed of polder lands built in the 20th century. The current ambition is to produce 60% of the provincial energy requirements (excluding mobility) through sustainable methods. The plans are to increase this to 100% by 2020 and to do so while reducing the number of wind-turbines from 600 to 300. The aim of this concentration of a smaller number of much larger windmills in wind parks is partially to restore the open landscape that is now considered to be quite saturated. Through the participation of citizens in the necessary investments, the provincial government aims to have a large proportion of the population profit from the wind energy proceeds. Together with the municipalities, the water authority and some private parties, the provincial government recently attempted to develop a “Sustainable Energy and Development Company”. Due to the economic crisis and budget cuts however some partners withdrew and in 2013 new alternatives are being sought. Being a largely agricultural province bio-energy could also be considered a viable energy source, however currently only 5% of sustainable energy is produced in this way. There are no Duurzame dorpen initiatives currently registered in Flevoland and only 5 listed by HIER Opgewekt making it the Province with the lowest number of recognized projects.

### *Province of Utrecht*

The province of Utrecht supports local initiatives through a Guarantee Fund. This fund basically guarantees that approved investments will be earned back within 15 years. Apart from this fund, the province does not have a strong renewable energy policy. In its most recent 2008-2011 plan on climate (Climate in Shape – translated from Klimaat op Orde) the provincial government has taken a rather broad view on climate that includes many adaptation measures, awareness raising and making their own offices climate-neutral. However in relation to other provinces the ambition regarding renewable energy production beyond the stimulus of the fund is not very strong. The fund was also

integrated in a “Green Deal” with the Dutch central government in 2012. As in Overijssel, Utrecht has had a bio-energy potential assessment report produced.

#### *Province of North Holland*

While the province of North Holland has a long coastline and thus high wind energy potential, its policies regarding land based wind energy are very restrictive, mostly due to landscape and nuisance concerns. The north of the province is connected to the Energy Valley and its Waddenzee island of Texel has the high ambition of becoming fully energy autarkic. In its provincial plan (Course Document Sustainable Energy 2012-2015) offshore wind energy is mentioned as being potentially stimulating to the economy in the harbor area. For smaller scale initiatives a service-point for Sustainable Energy has been created. Biogas and solar are mentioned, but only biogas is substantially elaborated upon. The “Solaroad” is one interesting idea that is mentioned for development where road pavements are designed to act as solar panels. The initiative was developed at the Dutch organization for applied technology research (TNO) and is supported by the province. The province has founded an Energy Board to provide advice on energy matters. Similarly to the province of Utrecht, North Holland has a fund to support initiatives. This fund is however directed toward “companies”, and not all of them belong to the field of renewable energy. The relatively low ambition of the province has evoked discussion within the provincial council. There are no registered projects through the Duurzame dorpen network however 25 projects can be found listed on HIER Opgewerkt.

#### *Province of South Holland*

The province of South Holland recognizes the potential for various forms of green energy to contribute to achieving its goal of 14% renewable energy by 2020: inclusive of wind, sun, geothermal and biomass. It also recognizes the implications that this transition will have for the grid. The province supports local warmth nets and links from local to regional nets to make the best use of green energy. Wind energy production is planned to increase from the current 260 MW to 730 MW in 2020. A plan is already in place to achieve an additional 260 MW on a large island located in the south of the province, with the collaboration of the four municipalities located on the island. The province also acknowledges that for private households solar energy has approached the breakeven point that makes it a good investment, but has concerns about the spatial implications. No special support for local initiatives however was to be found on the provincial website. A special subsidy regulation for farmers aims to replace all shed roofs containing asbestos with new roofs with solar panels. Regarding warmth an active policy supporting municipal plans and the formation of private-public partnerships with revolving funds was found. The province developed a map to show the biomass potentials and wants to support their use by guiding initiatives through the accommodation of regulations. The KIZZ network in which the province, municipalities and knowledge institutes participate has acted as a platform for information exchanges. Again, here there are no Duurzame dorpen projects but a relatively high amount of projects (24) listed by HIER Opgewekt.

### *Province of Zeeland*

The province of Zeeland has the only substantial nuclear power plant in the Netherlands, near the village of Borsele. Discussions often arise regarding the closure of the relatively old plant, or adding an extra one, now and then flares. For sustainable energy the provincial government concentrates on bringing parties together and sponsoring applied research. Together with the Belgium provinces of East and West Flanders they have an Interreg project that among others subsidizes local citizen initiatives for sustainable energy. A “Menu for energy and climate action” functions as inspiration for the province and municipalities alike. A climate fund is here being used in principle to compensate CO<sub>2</sub>. But it is doing this not by planting trees in other parts of the world but by for instance giving extra subsidies for households to buy solar panels. In 2020 the province wants to have 500 MW of wind energy installed. They do not want this to lead to decentralised energy production, but concentrate new developments into a limited number of designated “concentration area’s”. In fact they do almost all things the other provinces are doing and all with a certain degree of ambition. An interesting extra is about tidal energy: a small pilot that will generate about the same as one large wind turbine.

### *Province of North Brabant*

Like most other provinces Brabant has recently concluded a “Green Deal” with the central government, in this case called “Smart Energy Regions”. Research and innovation are the largest components in the planned activities of this network on new sustainable energy for the built environment. The provincial policy document “Energy Transition Potential for Innovation and Sustainability 2010” aims to facilitate solar and bio-based energy opportunities. Job potential related to these two fields is estimated at 12 to 15 thousand full time equivalents in 2020. Solar technology is important to the province due to the presence of high tech institutes and companies. In 2010, the area surrounding Eindhoven contained about 3% of this quickly growing world market. Brabant was a frontrunner in biogas production that was likely related to its history of having enormous problems due to surplus manure from animal husbandry operations. There is currently a great deal of resistance against a private proposal to test shale gas extraction potential near the town of Boxtel. In North Brabant there are also no Duurzame dorpen initiatives. There are however 26 projects listed on HIER Opgewekt.

### *Province of Limburg*

The coal reserves located in the southern-most province of Limburg once provided the largest source of domestic energy. This was prior to the discovery of the Slochteren natural gas field in the north of the country at the end of the 1950s. In the sixties the mines were closed and since this time the economic structure of the province has remained weak. The provincial policy took a radical stance towards sustainable development by embracing the C2C (“cradle to cradle”) philosophy in 2009, which included a positive self-evaluation about its outlook in 2010. An implication is that Limburg is taking serious steps at increasing solar energy production. In central Limburg solar energy companies contribute to approx. 0.5 % of the regional economy (source: CBS, Economische radar duurzame

energiesector, 2011: 7). Available from May 2012 until May 2014, the province opened a 6 million Euro subsidy program that is also available to private households. However by November 2012 this fund had already been exhausted (apart from some options left open for schools and sports clubs). Beginning from November 2012 a loan fund was created for initiatives for energy saving as well as solar energy production. This enables the people to borrow in a “cost-neutral” manner: the savings on the energy bill are used to pay back the loan and after 10 or 15 years the loan is cancelled and the future savings remain for the borrower. The province initiated an informative campaign site “WATT mooi” (watt beautiful) is guiding citizens and organizations towards options in energy saving and local energy production, including subsidy possibilities. Finally, there are again no duurzame dorpen initiatives in Limburg, yet there are 12 projects listed on HIER Opgewekt.

### *Synthesis of Provincial Developments*

The overview above shows that all provinces are at the very minimum attempting to meet the official national goals through policy and program efforts. The province of Flevoland is someone apart since it endeavours to implement large scale wind energy and aims explicitly higher than the other provinces. The general policies pursued and initiatives taken show a remarkable diversity in emphasis and ambitions. The policy instruments vary in strength and nature. The emphasis on the combination of energy sources is also quite different among the Dutch provinces. This diversity can originate from geographical factors as well as varying political choices. What is remarkable is that even in provinces with a low degree of support for local initiatives such initiatives are developing at a high pace. For instance local initiatives to support and organize solar energy are present in all provinces regardless of whether these are taken seriously by the provincial government. National and international market conditions (electricity price and solar panel price), national rules and regulations and national scale NGOs are obviously enabling factors. The preliminary conclusion is that concentrating the research on a specific area like a certain province to level out part of the context conditions might be more restrictive than helpful for the study. Analyzing the rapid expansion of local initiatives and their support associations is thus chosen as it is believed to provide a more interesting selection of cases.

### 3. Stakeholder Identification and Collaboration

According to recent government statements: “The Dutch Government wants to help people with local sustainability projects that are hard to get off the ground. This includes sustainable energy or energy-saving projects. It does this by means of a "Green Deal". The present government will prioritize energy conservation by extending this Green Deals approach. Citizens, companies, local councils and stakeholder organisations are continually finding their own ways of being more energy efficient and sustainable. This occurs when for example through saving energy or even generating their own. But these initiatives do not always get off the ground, perhaps because of confusion about licenses, lack of collaborative partners, or ambiguous regulations. The Central Government would like to help to remove some of these barriers.” (translated from: Dutch Government website, 2013).

The above mentioned focus of the government and the results of the above mentioned scoping activities leads us to focus this research on locally developed CRE projects. Our resulting understanding of the most prominent CRE context is one of a multi-layered and complex system with influences developing from both high and mid-level policy and local level contextual factors (as mentioned in the first few paragraphs of the introduction). As per the description of WP3 in the final Description of Work Document for COMPLEX, task 3.2 stipulates that relevant stakeholders should be identified and contacted and a workshop organized to introduce the project to them. We have done so in two rounds. The first took place at the national scale and the second through communication with actors who are interested in developments at the case study scale.

#### *National level*

Based on an initial probing of contacts, we were made aware that there is currently a large number of conferences and meetings already organized related to CRE development in the Netherlands at the national level. As such, organizing a special Complex WP3 meeting for national stakeholders would most likely not result in significant participation. Thus, in order to make contact with national stakeholders it was prudent to participate and draw attention to our project through the existing national platform for the stimulation of the energy transition. For this, the main Dutch social-economic policy advisory body, the Social Economic Council, was contacted to see what opportunities there were for participation. This important advisory organization is composed of representatives from the main employers’ organisations, trade unions and independent scientific members (including non-voting representatives of Dutch ministries and planning agencies). This collection of stakeholders results in a platform where negotiations on labor conditions and social-economic reform policies are “framed”. The success and acceptance of government policy often depends on the amount of coherence that is achieved with agreements that have been made at this platform. The council has various working groups, one of which is the Committee on Sustainable Development, where one of the authors participates as an independent scientific member.

The Council launched a large scale initiative to gather stakeholders together to negotiate a national “Energy Accord” to guide the country towards a low carbon future ([energieakkoord.nl](http://energieakkoord.nl)). One of the

four negotiation “tables” is on energy saving in the build-up environment and renewable energy production. The Dutch Complex WP3 team got access to this platform and used it to relate with several stakeholders and inform them about the WP and the Complex project in general.

This joint meeting was held on March 15, 2013, in the SER building in The Hague with all stakeholders (knowledge institutes, environmental NGOs, new local environment NGOs, the associations of Dutch Provinces and the Dutch Municipalities, renewable energy companies and associations thereof, the Climate Association, representatives of Ministries, the Dutch Farmers association). A major lesson learned and confirmed during this meeting was about the importance of the manifold bottom up initiatives that are developing throughout the country and include for instance joint purchase of green electricity, crowd funding investments in new windmills, and schemes to provide streets and districts with solar panels. These many small projects show a dynamic growth that could overtake the often cumbersome and slow to develop implementation of renewable energy by the traditional large energy companies. Even when the total amount of energy produced is still modest compared to the energy demand of mostly heat, and mobility and the electricity demand of companies, the surge of local initiatives shakes the entire field from its “conform zone” of very slow adaptation. A province-wise overview of policies and developments (see above) confirmed this impression.

#### *Local level*

In order to get access to the local initiatives it is important to use the stakeholder contacts developed at the national platform as well as the associations of such initiatives that are developing to support these initiatives. Two of them are particularly active and have drawn most of the attention throughout the Netherlands: “Transition towns” and the rapidly expanding “Netwerk Duurzame Dorpen” (Network sustainable villages, website: [netwerkduurzamedorpen.nl](http://netwerkduurzamedorpen.nl)). This Network DD currently includes 66 villages. The majority are in the Province of Fryslân, however the others are spread across four other Northern provinces. Appendix 3 summarizes the energy related projects taking place in the Provinces of Friesland and Overijssel since they have the most number of projects between them that are connected the Network DD initiatives.

On Friday April 26 a full day Workshop was held at the headquarters of this organisation, in the Frisian village of Raerd. The workshop was attended by representatives of the Network DD and two of its working groups (one on energy and one on food), the new independent Frisian Energy Cooperation EKF, a local initiator, the Province of Fryslân and the Municipality of South West Fryslân.

Information was exchanged regarding the interests of the various parties to see if a fruitful cooperation could be established. The following paragraphs summarize what was learned about the Network DD during the meeting.

The Network DD is generally based on peer-to-peer communication, which is supported through their webpage and in-person meetings that are supported by the group. They deal with individuals as well as groups and have also been involved in attempts to increase collaboration between cities. It was noted that person to person communication is important for developing inspiration in actors (particularly those of older generations). They do not actively collect information about the various towns in order to study and understand trends but they do research different ways of achieving

various sustainability goals and share this info with their members. Innovation diffusion theory is something that they see as being relevant to understanding under what contexts these types of activities prosper. They believe that currently mostly early adopters are responsible for the majority of activities. They would like to move beyond this stage.

They are involved with various types of initiatives and have no requirements that groups must meet in order to become a member of the network. Activities such as community gardens, collective solar panel installations, plastic bag campaigns, and local markets are all examples of Network DD activities. In a number of cases, groups take on more than one activity at once. The Province of Friesland and the local municipality represented were active in supporting local sustainability initiatives but to different degrees and in different ways. There was an open discussion about the role of the government in steering these kinds of activities. The government officials responded generally that they as administrative bodies should not play too active of a role in governing these activities. This was however debated based on a number of pros and cons including the opportunities to increase the efficiency of these quickly developing activities, overseeing development so as to increase diversity and equality across areas and the capacity of people to decide for themselves what is best for their particular circumstance.

After the workshop all involved agreed that in principle they will support further cooperation between the network and its affiliates and the Complex project, creating a basis for further stakeholder involvement in the next stages of the project. This partnership document is under construction along with the development of how the next stages of the research will be undertaken.

#### **4. Summary: Final Case Study Selection Results**

Based on the above description of the current developments in the Netherlands, we have chosen to begin with small scale case studies in a number of interesting projects in various communities. This will be followed with a survey that can help to understand the general trends related to context and the development of energy projects.

Phase 1 Research: (Pilot) Decentralized Solar - in the context of local SD efforts (low land use impact, high potential, low barriers from societal concerns)

Phase 2 Research: On-Land Wind - (medium potential, medium land use impact, high barriers from societal concerns)

Phase 3 Research: Bio-mass; not from first stream mass, but only second stream, decentralized (high potential, med-high land use impact, medium barriers from societal concern).



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## **Appendix 1: The Netherlands: policy analysis and evaluation of the period 1974-2011**

*Produced by Beau Warbroek, University of Twente*

### ***Analysis: 1974-1989***

The Netherlands has a long history with policy instruments that support renewable energy sources. Dutch policies stimulating RES not only differed in type (feed-in tariffs, quotas), but also in their focus (demand, supply) (Agnolucci, 2007).

The energy crisis of 1973 led to a paradigm shift among the Dutch policy makers. Energy differentiation was acknowledged to be an important aspect in energy security. Consequently, the Dutch government affirmed the potential role of renewable energies. However, in the 1974 White Paper, consensus was that RES would not provide a significant market share in energy production between 1975 and 1985 (Ministerie van Economische Zaken [EZ], 1974). The Dutch government was convinced that wind turbine technology would be the first viable RES, and consequently developed supportive programs for the development of wind turbine technology (Ministerie van EZ, 1974, Dinica & Arentsen, 2001).

The Electricity Act 1989 initiated the Dutch incentive to liberalize the energy market. The act gave guaranteed demand for de-centralized producers of electricity. This was of great advantage for renewable generators. Additionally, price floors would ensure an adequate remuneration, but in practice this was not quite the case (Dinica & Arentsen, 2001). The Electricity Act in 1998 put even more restrictions on the remuneration received by de-central generators. This price floor was calculated on the basis of average avoided costs, and in the end formulas to calculate the price were negotiated by the distributors and private producers. The government did not have any jurisdiction in this matter. These two reasons contributed to a weak guaranteed demand for RES.

### ***Analysis: 1990-2001***

The 1974 White Paper was followed up in 1990 by a new policy initiative, namely; the introduction of the first national environmental program (Nota Energiebesparing) in the Netherlands. This program stressed the importance of sustainability and strived to achieve this via energy savings and RES. Pivotal in this program was the stakeholder approach; the government identified sectors that would receive different obligations regarding sustainable energy. Different kinds of policy instruments were used in this program: Information and subsidies (mixed instruments), regulations (compulsory instrument), priming the role of utility companies (distribution sector) and cooperating with administrative authorities (mixed instrument), stimulation of Research & Development.

Energy distribution companies took initiative in correspondence with the national government to set up a voluntary program, known as the Environmental Action Plan (Milieu Actie Plan (MAP))(Ministerie van EZ, 1990). The Dutch government stated the pivotal role of the distribution sector. According to the program, the distribution sector is more close to the energy consumer than the national government and therefore the relationship of supply and demand (utility company – consumer) is suitable to be utilized for stimulating energy savings. Thus, the Dutch government uses a market based approach but with ties to the government (mixed instrument).

The energy distribution sector, represented by EnergieNed replaced the former MAP by MAP-II. Two approaches were conducted in decreasing the CO<sub>2</sub> emissions: addressing consumption by limiting the demand for energy (consumers), and enabling the production of RES that addresses the supply side (producers). Measures that were perceived to have a high cost-effectiveness were prevalent (Energieonderzoek Centrum Nederland [ECN], 1994). The MAP-II scheme set more ambitious targets for decreasing CO<sub>2</sub>-emissions: from 4.6 million tons of CO<sub>2</sub> emission to 11 million tons, and was more effective than the first MAP scheme (ECN, 1994)

The consensus formulated in MAP-II addressed the period of 1991-2000 and acknowledged the pivotal role of RES, and provided a framework for later RES policies. The MAP-II focused on three groups: households, firms and the government, and the energy distribution sector. Goal of this scheme was to decrease the CO<sub>2</sub>-emission. Stakeholder organization EnergieNed supported public authorities in enforcing MAP by stressing energy efficiency, stimulating energy-saving technology and producing RES.

RES were promoted by the MAP levy as well as the governmental support out of public resources (Dinica & Arentsen, 2001). The increase in consumer tariffs (MAP levy) supported the investment in RES projects. Funds collected from this scheme were returned to distributors and generators applying for production or investment subsidies. However, the MAP levy favored energy distributors above energy generators, and specific types of technologies (wind turbines and co-generation plants (Dinica & Arentsen, 2001). The MAP-II scheme did help RES through the first phase of market implementation; demonstration and introduction.

The follow up paper in 1994 took the same stakeholder approach as the Nota Energiebesparing in 1990. Once again, the Dutch government acknowledged the important role of intermediate organizations in linking supply and demand (utility companies). Public authorities assumed a role of regulation and stimulation (Ministerie van EZ, 1993). The strategy conducted by the Dutch authorities to ensure society with “clean, affordable and reliable energy till 2000” was of a voluntary nature. Incentive was to eradicate institutional restrictions to the energy market and making the market self-regulatory (Ministerie van EZ, 1993). Moreover, exhortation and subsidies (fiscal incentives, reward incentives, tariffs) were again placed in the arsenal of policy instruments. Additionally, Research & Development received attention in stimulating innovation.

Stimulating RES in MAP-II was primarily done by the means of subsidies and feed-in tariffs (Energieonderzoek Centrum Nederland (ECN), 1994). The share of RES was set for 2.8% by the end of 2000.

But, MAP-II and the White Paper of 1994 stressed energy efficiency and savings, postponing the potential role of RES after 2000.

The Dutch government published the third White Paper in 1996, setting targets for energy efficiency and RES specifically (RES in an implementation program published in 1997 by EZ). In the period of 1995-2020, 10% of the total energy consumption in The Netherlands would have to be from RES. The government did not exclude import as a means for supply. As a consequence, import of green energy increased dramatically, pointing out the importance of terminology (Reijnders, 2002).

Incentives to intensify market-introduction for RES clashed with the intentions to liberalize the energy market (Ministerie van EZ, 1996). Previous instruments to stimulate RES were focused on utility companies selling a minimum target of RES to contracted consumers. However, since consumers now receive the opportunity to switch energy supplier, this instrument would not be effective anymore. Consequently, fiscal incentives would be the best option (Ministerie van EZ, 1996).

Policy instruments effectuated to achieve the targets were set up in an action plan (Ministerie van EZ, 1996; Ministerie van EZ, 1997):

#### *Market Penetration*

- Tax exemptions for generating or importing firms of green energy, or production subsidy (Regulerende Energiebelasting; REB\*). Zero rate in 1998 for RE that are passed on to consumers under the heading of a green electricity contract.
- Tax increase for electricity and gas (REB)
- Green electricity products for voluntary purchase: schemes made by distributor companies for consumers who are willing to pay extra for RES. Funds are used for subsidies for investment or production by distributor or generator companies that did not receive a MAP levy (consumers do not have to pay for the MAP-levy on top of this tariff) (Dinica & Arentsen, 2001).
- Tax exemptions on interest received by investing in funds for green energy (green funds)
- VAMIL (or; accelerated depreciation): scheme where investors may choose when they benefit from the support: it increases the firm's profits in the first phases of the RES project, and reduces it later.
- Investment costs subtraction for green energy technologies
- Initiative of distribution firms to increase the application of RES among consumers
- Initiatives of distribution sector in MAP-II scheme: Green label trading system: provided for 1500 GWh generated by RES in the years 1998-2000. This was a voluntary scheme initiated by the energy sector (Dinica & Arentsen, 2001)

#### *Technology Push*

- Increase of budget for R&D, coordinate R&D among the various organizations involved to make sure all go the same direction (direct financial incentive)
- Targeting the uncertain first phase of new technologies by providing market introduction and demonstration projects out of public resources

\*The REB tax scheme was effective in two ways: it encouraged the demand for green energy by increasing the price level of fossil fuels. Consumers will subscribe for voluntary green electricity schemes. Plus, RES generators receive subsidy and are encouraged to invest in new green

projects. Additionally, because of the rising level of the REB tax, and the conditions of green electricity schemes, some distributors were able to offer green energy at the same price of conventional energy (Dinica & Arentsen, 2001). The REB is later on replaced by MEP.

EZ included amendments for the Electricity Act in 1998 that would enter into force in 2001. The Electricity Act 1998 contributed to the incentive of the Dutch government to liberalize the energy market. The government increasingly alters its role as actor (as owner of energy companies) and regulator, to solely regulative tasks (Ministerie van EZ, 1999). The government switches from public enterprises instruments to more voluntary and mixed instruments.

Among others, one of the clauses included was the minimum amount of electricity generated by green energy. To prove that the share of green energy is achieved, consumers or distributors must be able to present green certificates. The green certificate proves that the electricity producer transported a certain amount of green energy to a distributor or consumer in a specific time period. These green certificates are tradable, this is known as the Tradable Certificate System (Ministerie van EZ, 1997). However, obligating a guaranteed share of green energy addresses the demand side, and does not resolve issues concerning the supply side (location-, permits-, and investment issues) (EZ, 1999). Therefore, the green certificate system along with the stimulation of both supply and demand would be a viable solution according to the Dutch authorities (Ministerie van EZ, 1999). An obligated share of green energy would have to be allocated to the supply side in order to be effective. However, this instrument rather establishes a separate green market, than integrating RES in one market (Fraser et al., 1998).

### ***Analysis: 2002-2011***

An evaluation report published by EZ in 2002 observed an increase in demand for green energy, but the inability of the supply side to meet this demand. Spatial planning and investment climate are the two factors that hinder the supply of green energy (Ministerie van EZ, 2002). The Netherlands' is not able to achieve the targets set for RES by domestic supply. Therefore, another means to realize the target is the import of green energy. This notion cannot be ignored; the Netherlands relied on supply outside the realm of its domestic capabilities. Thus, after 2003 policies were more focused in supporting the supply-side. Moreover, the energy report stated that there was a lack of investment climate stability.

The Netherlands took a new approach to transfer to a low-carbon economy; transition management (Ministerie van EZ, 2002; Ministerie van EZ, 2004). It included a long-term policy; based on energy research funded by public resources, the inclusion of all relevant target groups in resolving barriers and formulating common goals. This transition approach was not effective as observed by Kern & Smith (2008). This is because actors in the incumbent energy regime are dominant and hinder system innovation and structural change. Therefore, technology-push received most attention, neglecting other learning processes important for transition management and implementation (Verbong et al., 2008; Kern & Smith, 2008). Additionally, the narrow social network involved in the policy process contributed to the technology push approach (large firms, knowledge institutes, stakeholder organizations) (Verbong et al., 2008).

In 2003, the Dutch government implemented a subsidy scheme for domestic producers, MEP ((Mileukwaliteit van de Elektriciteitsproductie). Foreign RES producers could not be excluded from the REB-exemption because of EU regulation. Therefore, the MEP was introduced to stop the loss of subsidy to foreign producers (because of the relative high share of green energy imports) (Ministerie van EZ, 2005). The cost-efficiency and cost-effectiveness were the drivers for the Dutch government to revise the REB-exemption. MEP was a flexible tariff determining the amount of subsidy allocated relative to the development and scale benefits of the technology in concern. The MEP differentiated between technologies (such as solar-, and windpower) for RES. Main objectives were to reduce investment risk and to improve the cost-effectiveness of RES (Rooijen & Wees, 2006).

Research commissioned by the Tweede Kamer observed that the MEP-subsidy scheme was too costly as well (Algemene Rekenkamer [AR], 2007). The scheme was abolished in 2006 and superseded by a new policy instrument. In pursuit of more ambitious targets (20% RES in 2020, (Ministerie van Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer [VROM], 2007)) for reducing CO2 emissions, the Dutch government replaced MEP by a new scheme; Stimulerend Duurzame Energie (SDE) in 2008. Differences between the two schemes were that SDE was to be financed completely by direct government support, and projects were selected through tendering (International Energy Agency [IEA], 2012). Additionally, the sum of subsidy is dependent on the prices of fossil fuels. Under the SDE, producers enjoy a fixed price per kWh. Consequently, when the electricity price exceeds the feed-in tariff price, no subsidy is rewarded to the producers; a flexible feed-in tariff (IEA, 2012).

The SDE was later on superseded by SDE+ in 2011. This policy scheme benefits the cheapest technologies producing RES. Cheap technologies can apply for subsidy in the first place, costly technologies may apply for higher subsidies, but are only granted these subsidies if the annual budget meets their demand (International Energy Agency IEA, 2012).

### ***Evaluation***

In conclusion the policy approach of the Netherlands in the 90's and beginning of the 21<sup>st</sup> century is primarily based on market stimulation, regulation and voluntary agreements (Ministerie van EZ, 2002). The early 90's was characterized by voluntary agreements of the government with the energy distribution sector, setting goals for green energy sales.

Wind energy cost recovery incentives were initiated throughout the 90's, while bio-mass and solar PV technologies were only supported in the beginning of the 90's (Dinica & Arentsen, 2001). Additionally, wind energy mostly received support for demonstration projects, while solar PV and biomass received support for demonstration and market introduction projects.

Subsidies till 1996 supported market introduction and financed 25-35% of the total project costs of the RES. After 1996, subsidies were mostly allocated to demonstration projects that financed 25 – 40% of the investment. Production subsidies were cut short (Dinica & Arentsen, 2001).

Distributors had the highest market share as investors of RES because they allocated the financial resources in the Electricity Act and the MAP levies.

Although private and utility generators had equal access to the fiscal and financial support schemes, private actors enjoyed them to a lesser extent because the incentives were in principle too complex for correct and timely application (Dinica & Arentsen, 2001). Actors involved were not sure where the responsibility in RES promotion lay; in the consumer or producer? Revenue was difficult to calculate, and burden sharing was not clear (Dinica & Arentsen, 2001; Rooijen & Wees, 2006).

Although the target for the Dutch government was the supply side between 1996-2001 in reducing administrative bottlenecks (spatial planning) and providing a stable investment climate, policies were mainly directed at the consumer. The policies were flexible, but mostly ineffective (Rooijen & Wees, 2006; Agnolucci, 2007).

From 1996, the focus was on demand with the introduction of the REB tax. This did not lead to new green energy projects but to increased imports (Dinica & Arentsen, 2001; Rooijen & Wees, 2006). From 2003 on, the focus shifted to the production side with newly implemented, regulated feed-in tariffs.

Green electricity schemes did not initiate investment in new technologies or expansion of the installation of green technologies (Dinica & Arentsen, 2001). Subsidies were not reliable in the long-term; varying extent and different criteria applied from time to time. Additionally, policies focused too much on fiscal and financial instruments instead of social, administrative and institutional aspects of new technology diffusion. These factors are pivotal for transition management (Kern & Smith, 2008). Also, the focus on new technology diffusion in energy market prevailed, instead of diffusion in society (Dinica & Arentsen, 2001).

Throughout the policy history of the Netherlands, targets set by the government, or targets set voluntarily by the energy sector were not achieved. Plus the targets were always of a voluntary nature (Rooijen & Wees, 2006). Additionally, stable and long-term policies were absent (Dinica & Arentsen, 2001; Agnolucci, 2007; Verbong, et al., 2008). The only stable policy was REB. Lastly, the transition of market diffusion subsidies to demonstration projects subsidies was too rapid.

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## Appendix 2: Netherlands scoping statement: internet sources

### General / country wide:

[http://nl.wikipedia.org/wiki/Groene\\_stroom](http://nl.wikipedia.org/wiki/Groene_stroom)

Dutch provinces are often investing their revenues from selling shares in energy companies in the stimulation of green energy. But Drente for instance couldn't do that because it didn't have such shares. In that province a lot of local initiatives create the momentum.

The Dutch social economic council has given an advise about "more chemistry between growth and green" – indicating that burning bio-fuel might not be the most efficient use of it.

The Council has also initiated a Energy Transition platform:

<http://www.ser.nl/nl/actueel/congressen/2012/20121116-energieakkoord.aspx>

<http://www.energieakkoordser.nl/>

North of the Netherlands: Energy Valley:

<http://www.veendammer.nl/nieuws/14567/energy-valley-wil-groene-energieambities-met-kabinet-rutte-ii-invullen/>

Overview map of the Netherlands' bottom up initiatives:

<http://www.hieropgewekt.nl/initiatieven/>

A map (google earth based) with Dutch wind parks is available and data are for sale:

<http://www.windenergie-nieuws.nl/kaart-met-windparken/>

Overview of sustainable energy initiatives (privately made and incomplete):

<http://henribontenbal.wordpress.com/2011/11/21/lokale-en-cooperatieve-duurzame-energie-initiatieven/>

Another overview of energy co-operations:

<http://www.greenprices.nl/energiecooperaties/>

National policy is partly now a matter of "Green deals" a sort of (neo-liberal) successor of the system of environmental and energy covenants in which private investors need to participate and government mostly facilitates:

[http://www.degroenezaak.com/upload/files/boekje\\_green\\_deal\\_energie\\_dgz.pdf](http://www.degroenezaak.com/upload/files/boekje_green_deal_energie_dgz.pdf)

An overview from the national government:

<http://www.rijksoverheid.nl/onderwerpen/duurzame-energie?#ref-vrom>

Ethical banks (supported by tax advantages that have decreased but are still working) support a lot of projects with capital:

<http://www.triodos.nl/nl/over-triodos-bank/mijngeldgaatgoed/resultaten/?projectId=105825>

With cooperation of environmental NGOs a supplier was started in 2001 (thus before the take-off of bottom up initiatives) that has green purpose on top, GreenChoice:

<http://www.greenchoice.nl/thuis/acties-van-greenchoice/kies-uw-stroombron>

An overview of subsidy possibilities, national, provincial (Brabant, Friesland, Limburg) and local:

<http://www.duurzaamthuis.nl/financieel/subsidies/zonne-energie>

#### **Province of Groningen:**

<http://www.provinciegroningen.nl/beleid/klimaat-en-energie/>

The provincial plan 2012-2015:

[http://www.provinciegroningen.nl/fileadmin/user\\_upload/Documenten/Downloads/Programma\\_Energie\\_2012-2015.pdf](http://www.provinciegroningen.nl/fileadmin/user_upload/Documenten/Downloads/Programma_Energie_2012-2015.pdf)

#### **Province of Fryslân:**

<http://www.fryslan.nl/geeftenergie>

<http://www.fryslan.nl/duurzameenergie>

Map of energy and water activities:

<http://www.fryslan.nl/4251/overzichtskaart-watertechnologie-en-duurzame-energie/>

Farmers current (initiative with national support organisation):

<http://www.boerderijstroom.nl/>

Initiative for new green energy cooperation:

<http://www.drachtstercourant.nl/nieuws/12839/friesland-krijgt-eigen-energiebedrijf-voor-groene-stroom/>

The Dutch Wadden Isles (most of which belong to Fryslân) have an own ambitious program:

[http://www.waddenzee.nl/Duurzame\\_Waddeneilanden.2220.0.html](http://www.waddenzee.nl/Duurzame_Waddeneilanden.2220.0.html)

[http://www.waddenzee.nl/fileadmin/content/Dossiers/Duurzaamheid/pdf/Krant\\_\\_Onze\\_eilanden\\_100\\_\\_duurzaam.pdf](http://www.waddenzee.nl/fileadmin/content/Dossiers/Duurzaamheid/pdf/Krant__Onze_eilanden_100__duurzaam.pdf)

<https://www.box.com/s/kr4b09nhr4hergptd1gn>

#### **Province of Drenthe:**

Provincial overview site:

<http://www.provincie.drenthe.nl/onderwerpen/natuur-milieu/klimaat-energie/>

Provincial plan 2012-2015:

[http://www.provincie.drenthe.nl/publish/pages/73922/energieprogramma\\_2012-2015.pdf](http://www.provincie.drenthe.nl/publish/pages/73922/energieprogramma_2012-2015.pdf)

People initiative:

<http://www.mwhglobal.nl/nieuws3/volksraadpleging-groene-energie-drenthe>

Support and finance organisation for initiatives

<http://www.drentseenergieorganisatie.nl/Wat-we-doen.html>

Map of initiatives in Drenthe:

<http://www.hieropgewekt.nl/initiatieven/drenthe>

Special local initiative in the north of the province:

<http://www.mienarf.nl/>

Earth warmth organisation:

<http://www.aardwarmtedrenthe.nl/>

Search map for wind energy:

[http://www.provincie.drenthe.nl/publish/pages/73766/kaartje\\_zoekgebiedwindmolensa\\_1.pdf](http://www.provincie.drenthe.nl/publish/pages/73766/kaartje_zoekgebiedwindmolensa_1.pdf)

Link to Agreement of all provinces with national authorities on the division of targets for wind parks:

<http://www.provincie.drenthe.nl/onderwerpen/natuur-milieu/nieuws/@90310/provincies/>

### **Province of Overijssel:**

Overview of province plans:

<http://www.overijssel.nl/thema's/economie/nieuwe-energie>

Energy “pact” 2010:

[http://issuu.com/overijssel/docs/energiepactwerkinuitvoering?mode=a\\_p](http://issuu.com/overijssel/docs/energiepactwerkinuitvoering?mode=a_p)

“New energy” plans (mostly bio-energy):

<http://www.overijssel.nl/thema's/economie/nieuwe-energie/nieuwe-energie/>

<http://www.overijssel.nl/thema's/economie/nieuwe-energie/nieuwe-energie/biomassa-bio-energie/>

Sustainable villages (initiatives stimulated by provincial contest, but network in the whole of north Netherlands – other initiatives mainly in Fryslân):

<http://www.overijssel.nl/thema's/milieu/duurzaamheid/duurzaam-dorp>

<http://www.netwerkdurzamedorpen.nl/overijssel?list=true>

## **Province of Gelderland:**

Program Plan:

<http://www.gelderland.nl/smartsite.dws?id=20311>

Recent plan:

[http://www.gelderland.nl/Documenten/Themas/Milieu\\_Klimaat\\_en\\_Water/Energietransitie/Statenvoorstel\\_Energietransitie\\_PSVersie.pdf](http://www.gelderland.nl/Documenten/Themas/Milieu_Klimaat_en_Water/Energietransitie/Statenvoorstel_Energietransitie_PSVersie.pdf)

Overview of bottom up initiatives:

[http://gelderland.groenlinks.nl/files/Kort%20overzicht%20van%20lokale%20duurzame%20energiebedrijven%20 gelderland.pdf](http:// gelderland.groenlinks.nl/files/Kort%20overzicht%20van%20lokale%20duurzame%20energiebedrijven%20 gelderland.pdf)

Network of municipalities for green energy:

<http://duurzameenergiegelderland.wing.nl/>

Actor overview:

[http://duurzameenergiegelderland.wing.nl/kennis\\_en\\_inspiratie/Actorenskaart\\_Gelderland](http://duurzameenergiegelderland.wing.nl/kennis_en_inspiratie/Actorenskaart_Gelderland)

with all projects:

<http://duurzameenergiegelderland.wing.nl/kaart/>

## **Province of Flevoland:**

General overview and own Development Company:

<http://www.flevoland.nl/wat-doen-we/duurzaamheid/beleid/duurzaamheid-en-energie/duurzame-energie-en-ontwi/>

Flevoland (20th century large new polders) is leading in land based wind energy. The plans are to produce much more while halving the number of mills from 600 to 300:

<http://www.flevoland.nl/wat-doen-we/duurzaamheid/beleid/windenergie/>

They also have a support for bio fuels:

<http://www.duurzaamflevoland.nl/ringg20>

With Wageningen university they have a practice centre for green energy and agriculture:

<http://www.acres.nl/>

Also the Nature and Environment Federation is ambitious:

<http://www.natuurenmilieuflevoland.nl/handlers/i.aspx?/id=4482>

## **Province of Utrecht:**

The province of Utrecht has not much on its website:

<http://www.provincie-utrecht.nl/onderwerpen/alle-onderwerpen/klimaatprojecten/>

Of course it could also reflect the quality of the website itself. They seem to be quite aware of adaptation needs.

They do support local initiatives with a Guarantee Fund:

[http://www.provincie-utrecht.nl/publish/library/681/garantiefonds\\_energie\\_provincie\\_utrecht\\_2009-03-31.pdf](http://www.provincie-utrecht.nl/publish/library/681/garantiefonds_energie_provincie_utrecht_2009-03-31.pdf)

<http://www.duurzaamnieuws.nl/bericht.html?id=90010>

Like for Overijssel, Ecofys has made a bio-energy potential assessment for Utrecht (but do not find own policies on this, except for the guarantee fund):

<http://www.ecofys.com/files/files/ecofys%20biomassapotentieel%20provincie%20utrecht.pdf>

### **Province of North Holland:**

Projects:

<http://www.noord-holland.nl/web/Projecten/Duurzame-energie-2.htm>

Policy programme 2012-2015:

<http://www.noord-holland.nl/web/Projecten/Duurzame-energie-2/Beleid.htm>

<http://www.noord-holland.nl/web/file?uuid=45e57389-38d5-45e7-8d3f-ecb9ec003c9a&owner=22d0e6d4-062d-4498-82f1-0416c87bf0d0>

An interesting project is on solaroad: to turn road into solar energy collectors:

[http://www.tno.nl/content.cfm?context=thema&content=inno\\_case&laag1=895&laag2=912&item\\_id=1234](http://www.tno.nl/content.cfm?context=thema&content=inno_case&laag1=895&laag2=912&item_id=1234)

They founded an Energy Board to connect policy, knowledge and companies:

<http://www.noord-holland.nl/web/Projecten/Duurzame-energie-2/EnergyBoard.htm>

Like Utrecht they have a fund:

<http://www.noord-holland.nl/web/Actueel/Nieuws/Artikel/Ontwikkelingsfonds-Duurzame-Energie-Provincie-NoordHolland-B.V.-ODENH.htm>

A service point advises municipalities:

<http://www.servicepuntduurzameenergie.nl/>

Ecofys criticises the province for being too passive about wind and bio-mass:

<http://www.haarlemsdagblad.nl/regionaal/haarlemeo/article14208093.ece/Provincie-Noord-Holland-te-passief-met-groene-energie>

### **Province of South Holland:**

Overview with the various sources clickable:

[http://www.zuid-holland.nl/overzicht\\_alle\\_themas/thema\\_economie\\_werk/c\\_e\\_thema\\_economie\\_en\\_energie.htm](http://www.zuid-holland.nl/overzicht_alle_themas/thema_economie_werk/c_e_thema_economie_en_energie.htm)

Map of wind energy locations:

<http://www.zuid-holland.nl/documenten/opendocument.htm?llpos=335404857&llvol=0>

Map for bio-energy:

<http://geo.zuid-holland.nl/geo-loket/html/atlas.html?atlas=biogas>

Also the use of remaining warmth is a priority:

<http://www.google.nl/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=4&cad=rja&sqi=2&ved=0CD0QFjAD&url=http%3A%2F%2Fwww.zuid-holland.nl%2Fdocumenten%2Fopendocument.htm%3Fllpos%3D173950063%26llvol%3D0&ei=0-QYUZLkDuqZ0QXOp4HgDg&usg=AFQjCNGGjUw-caFmoIODvuOH6P2wPujFfQ>

The province also has a large island. Here a large proportion of extra wind will be realized:

<http://www.zuid-holland.nl/nieuws/contentpagina.htm?id=101863>

### **Province of Zeeland:**

General:

[http://provincie.zeeland.nl/milieu\\_natuur/duurzame\\_energie/](http://provincie.zeeland.nl/milieu_natuur/duurzame_energie/)

[http://provincie.zeeland.nl/milieu\\_natuur/duurzame\\_energie/kadernota](http://provincie.zeeland.nl/milieu_natuur/duurzame_energie/kadernota)

In fact they do almost all things the other provinces are doing and all with a certain degree of ambition: funds, subsidies for bottom up initiatives:

<http://www.zeeuwsklimaatfonds.nl/projecten/overzicht-projecten> ], wind (with priority map), bio based energy, green gas. An interesting extra is tidal energy: a small pilot that will generate about the same as one big wind mill.

Climate change effects are put in maps:

<http://www.zeeland.nl/digitaalarchief/zee1101119>

There are various local initiatives:

<http://www.pzc.nl/regio/nieuwe-zeeuwse-stichting-voor-groene-stroom-opgericht-1.1932789>

A project connects solar energy with environmental education at schools: 120 school work together in the Zeeland Solar Factory:

<http://www.nme.nl/content/zonnefabriek>

On local initiatives:

<http://www.bibliotheek.nl/thema/energie/themas/>

## **Province of Brabant:**

Policy agenda:

[http://www.brabant.nl/dossiers/dossiers-op-thema/energie/energieagenda-2010\\_2020.aspx](http://www.brabant.nl/dossiers/dossiers-op-thema/energie/energieagenda-2010_2020.aspx)

Like most other provinces Brabant has a (very) recent “Green Deal”:

<http://www.brabant.nl/dossiers/dossiers-op-thema/energie/energie-actueel/energie-actueel-2013/brabant-tekent-green-deal-energie.aspx>

<http://www.brabant.nl/-/media/DDE1BC4E8C88487789D11A7DED4DE6BF.pdf>

The role of the provincial government is stipulated here:

<http://www.brabant.nl/-/media/6130A7ED13664284819635F4FB0771E6.pdf>

Also here bottom up initiatives:

<http://www.morgengroeneenergie.nl/nieuws/>

The water supply company is also via a daughter company active in energy projects (earth warmth and warmth – cold storage) all over the country.

<http://www.brabantwater.nl/NL/productenendiensten/duurzame%20energie/Pages/Duurzame%20energie.aspx>

A critical assessment of the implementation of the ambitions can be found in a newspaper article by a member of the provincial parliament from the Green Left party:

<http://www.ed.nl/mening/brabant-is-ver-verwijderd-van-energie-doelstelling-opinie-1.1614530>

In Boxtel there has been resistance against a pilot to extract “schaliegas”

<http://bureaudehelling.nl/blog/gasverslaving-belemmert-groene-energierevolutie>

## **Province of Limburg:**

Provincial sustainability policy:

[http://www.limburg.nl/Beleid/Duurzaamheid\\_Energie\\_en\\_Klimaat](http://www.limburg.nl/Beleid/Duurzaamheid_Energie_en_Klimaat)

It’s policy is influenced by the C2C philosophy and a self-evaluation is positive:

<http://www.limburg.nl/dsresource?type=pdf&objectid=limburg:3171&versionid=&subjectname=>

An implication is that Limburg is taking solar very seriously. In central Limburg solar energy companies are approx. 0,5 % of the regional economy (source: CBS 2011: 7)

<http://www.cbs.nl/NR/rdonlyres/4B1C4BCB-CE97-482B-A8EB-7B9EA402E3B4/0/2011economischeradarduurzameenergiesector.pdf>

They have an own subsidy scheme:



[http://www.limburg.nl/e\\_Loket/Subsidies/Actuele\\_Subsidieregelingen/Milieu\\_en\\_Energie/Nadere\\_subsidieregels\\_Limburgse\\_Energie\\_Subsidie\\_2012\\_2014](http://www.limburg.nl/e_Loket/Subsidies/Actuele_Subsidieregelingen/Milieu_en_Energie/Nadere_subsidieregels_Limburgse_Energie_Subsidie_2012_2014)

For energy this is the policy site:

[http://www.limburg.nl/Beleid/Duurzaamheid\\_Energie\\_en\\_Klimaat/Duurzame\\_energie\\_en\\_energiebesparing/Beleid](http://www.limburg.nl/Beleid/Duurzaamheid_Energie_en_Klimaat/Duurzame_energie_en_energiebesparing/Beleid)

The campaign “Watt mooi” is supporting initiatives:

<http://www.wattmooi.nl/>

They also have a loan fund, mostly for energy saving, but also for e.g. PV

[http://www.limburg.nl/Beleid/Duurzaamheid\\_Energie\\_en\\_Klimaat/Duurzame\\_energie\\_en\\_energiebesparing/Projecten\\_en\\_initiatieven/Limburgs\\_Energie\\_Fonds\\_Duurzaamheidsleningen](http://www.limburg.nl/Beleid/Duurzaamheid_Energie_en_Klimaat/Duurzame_energie_en_energiebesparing/Projecten_en_initiatieven/Limburgs_Energie_Fonds_Duurzaamheidsleningen)

An example of initiatives that deliberately include solar:

<http://www.d-bv.nl/duurzame-energiecentrale-limburg>

## Appendix 3: Some Examples of Local Initiatives for Solar Energy in the Provinces of Fryslân and Overijssel

*Project Name*      *Brief Project Overview*

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Boksum              Energy saving through solar panels and  
collaborative gardening

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De Griene  
Geaën              A group of 8 towns that want a more  
sustainable community. Increase of  
sustainable energy and reduce consumption.  
Communal purchasing of solar panels

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Leefbaar Energie Feanwâlden (LEF)

A local group that connects people, sustainability  
and energy. By becoming a member you get a  
reduced price for purchasing green energy by a  
particular company and you get a discount on solar  
panels for your own house. The profits of the group  
go towards local sustainability projects.

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Finkum Energie Neutraal

Groenkerk (Zon van Tryntsje)	Thinking globally, acting locally. Want to self-produce all energy necessary for housing, transport and business. The collective purchase of solar panels is one of their major actions for this thus far.  In terms of the panels, they offer support for before, during and after the installation to reduce the burden and risk for people who don't understand the issues and don't want to risk it going wrong and having to deal with it themselves
Duurzaam Grou	Currently a pilot being undertaken to collectively purchase solar panels
Heeg	To be energy self sufficient in 25 years
Joure (Duurzaam Treffen)	Based directly from the TT model (from website it looks this way anyways)
Duurzaam Koudum	Providing a clean and sustainable environment for future generations: ideally as an energy-self sufficient town
Kubaard	To invest in local sustainable energy, local environment, enable energy saving to provide funds to support local social initiatives. They have enough wind to provide 5 times what the village uses.

Stichting Lokaal Ideaal Makkinga	Teaching people to build their own solar collectors
Projectgroep Zouderzon	They want to set up a cooperation to collectively buy panels
Pingjum energieneutraal	To become energy neutral? Began with wind a very long time ago, and now they share the wind profits with anyone who can see them! But they are also developing solar alongside this (and are interested in biomass)
Reduzum	Began with wind turbine that provides profits to local group and have now added solar cells
Spannum- Edens	Local working group initiated an energy scan and are interested in private solar panel purchasing
Zonkracht 10	Looking at potential to install household and town-managed solar (and wind and water harvesting)
Zet Borne in de Zon	Collective purchasing of solar panels  Help support process and installation and choosing of panels
Duurzaam Vasse	To be energy neutral by 2015

development of a local energy cooperative and placing solar panels on various properties (public and private)

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Hoonhorst	Collective purchasing and placing of solar panels
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Duurzaam Lettele	Collective purchasing of Panels and support and info goal to be energy neutral
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Energie Neutral Noord Deuringen	To be energy neutral in 8 years
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Duurzaam Ommerkanaal	Just beginning to look for options for green energy development, will have the potential studied.
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Energie Besparing Hellendoorn	Have started a large energy cooperation - Regge stroom  Leaving it out since it has become large scale  and Hellendoorn is significantly larger than the rest  However it could be interesting as a case of a larger scale development
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Duurzaam Delden	Very small, basically a solar heater for a public swimming pool  Intentions to do a bit more
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Zon op Willemsoord	Collective purchase of solar panels to install on public building
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