Non-cost barriers to renewables

– *AEON* study

The Netherlands

Client: DG TREN

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1 Introduction

Progress of renewable energy deployment in the Netherlands traditionally is slow. Deprived of both natural altitude variations for hydropower potential and vast amounts of land area for woody biomass or energy crops, the main ingredients of its current domestic[1] portfolio are wind on land and household (and industry) organic waste incineration. Because of its inherent high population density, build environment integrated technologies enclose the main long-term prospective. It is unlikely; however, taking into account their position in the innovation curve, they will contribute substantially to the 14% 2020 target as mandated by the renewable energy directive[2]. For the 2010-2020 time periods, the most likely potential (in terms of producing petajoule) technology is **offshore wind energy.** It is expected around 6,000 MW offshore power will be connected to the main grid in the next coming years. [3] This ambition is partially materialised by the opening by the end of 2009 of a tender aiming at realising 950 MW offshore power.

By the end of 2008, the cumulative **onshore** and **offshore wind** capacity equalled 2,216 MW; about 470 MW more than in 2007. The non-binding parliamentary objective for onshore wind for 2020 is 6,000 MW as well. As discussed later on, however, progress of onshore wind energy currently is stagnating and limited to developing a few, although relatively large, parks. [4]

Cofiring of **biomass** at coal plants (**Amercentrale** at **Geertruidenberg, Centrale Gelderland** 13 near Nijmegen) has a long history. The Netherlands is a true innovator and one of the first countries adding various types of biomass like paper residues, waste wood, wood pellets, coffee husks, RDF, poultry litter, bone meal and even palm oil to the coal mixture. Presently there is no financial support for cofiring anymore, but it is likely that within a few years the playing field will change to some type of obligations. [5]

With regard to **biofuels,** the government decided to deviate from the European-wide 5,75 percent blending obligation for 2010 (Biofuel Directive 2003/30/EC) and to stipulate a reduced figure of 4% instead. [6] The foremost reason is that it is not possible supposedly to comply with the European obligation using sustainably produced biofuels only. Almost all biofuels (in practice limited to biodiesel and bio-ethanol) are imported from countries

1 Domestic in the sense that although cofiring contributes more than household waste incineration, all its biomass feedstock is imported thus not contributing to (closed) local supply chains.

2 The parliamentary ambition is even 20% for 2020 (the parliament recently resigned, though). For renewable electricity, the 2020 ambition even is 35%.

3 Net op Zee: Hoofdrapport Ministerie van Economische Zaken 2009.

4 Urk, Zuidlob near Zeewolde and Eemshaven, for instance.

5 Private communication anonymous official. Also raised at Dutch REPAP meeting (Driebergen, March 2010).

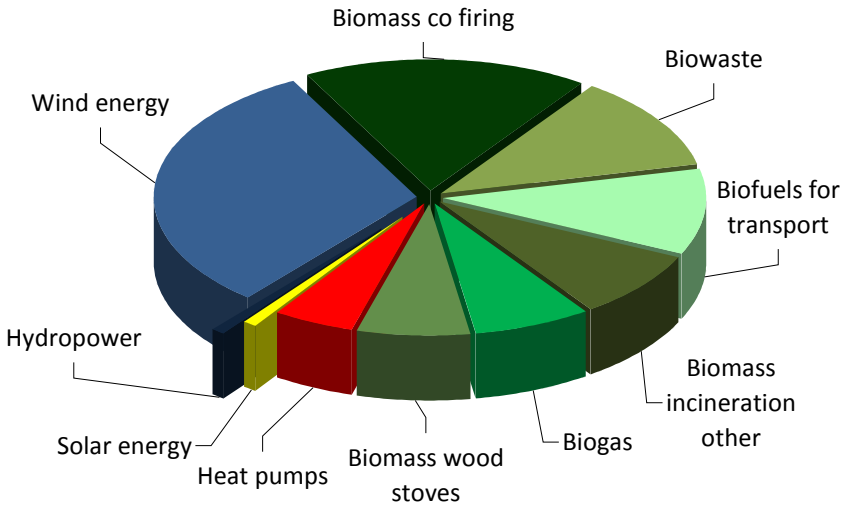
6 Ministerie van VROM 13 October 2008 DGM 2008099192.

like Brazil, Malaysia and Indonesia. Right now, NGOs fuelled an intense debate in the Netherlands to scrutinize to what extent these kinds of first generation fuels may be considered truly sustainable.

According to the agency Statistics Netherlands, the 2008 share renewable energy in final energy consumption is ca. 3,4%. The percentage of renewable electricity is ca. 7,5% of domestic electricity consumption. The orderly division of the former (in petajoule) over the various technology sources is as follows:

Wind energy	35,1
Biomass cofiring	19,7
Waste incineration (biowaste)	13,1
Biofuels (for transport)	12,0
Biomass incineration other	9,1
Biogas (from digestion)	8,2
Biomass wood stoves	8,0
Heat pumps and aquifer	5,4
Solar energy	1,2
Hydropower	0,8
Total	**112,6**

And visually depicted as:



It can be observed that the majority (62%) of the renewable energy consumption is biomass related; either solid, gaseous or in a liquid form.

Moreover, several technologies like (deep) geothermal energy, large-scale hydropower, concentrated solar power, blue energy and ocean energy are almost absent and excluded from our study for the Netherlands accordingly.

1.1.1 Non-cost barriers

Main barrier as perceived by the market is the **lack of vision, ambition and long-term planning** by the government. Amongst others, this becomes explicit in the frequent alterations of subsidy programmes. In less than just a few years time, the REB[7] exemption regulation for renewables was replaced by the MEP[8] regulation, only to be replaced by the SDE ordinance[9] a few years later. These various policies stimulated different kinds of technologies as well.

The current SDE regulation possesses a **stop and go** nature in itself. Every year a few technologies are selected to be eligible for subsidy, their budget and their value of the SDE tariff are established accordingly. For example, in 2009 the budget available for small-scale photovoltaics (<100 kW) was oversubscribed by a factor 44 already on the first day the tender was opened. Something similar happened in 2010 for both photovoltaics and biomass. Onshore wind energy applications are limited because of cumulative permits deficits (permits are required prior to SDE application) and the relatively low SDE tariff for inland locations.

It also becomes apparent in continually shifting visions: in the early nineties, governmental focus was on small-scale solar energy, in the beginning of the new millennium on large-scale biomass exploitation[10] and in recent years on both onshore and offshore wind energy.

The second main barrier is the **permitting process.** In particular strong public (residents, NGO and local authorities such as municipalities) opposition leading to a relatively large number of formal protests and consequent legal cases in combination with the absence of designated areas for renewable energy facilities obstruct further deployment. Main technologies impacted are onshore wind energy, and energy production from biomass and waste. Some examples of projects encompassing a permit lead time of ten years or more are the Fibroned chicken litter incineration plant near Apeldoorn[11], cofiring of waste wood at the Electrabel (former EPON Gelderland 13) coal power plant near Nijmegen, the onshore wind park **Hagenwind** near Aalten and the **Prinses Amalia** (former Q7) offshore wind park.

Finally, it should be mentioned that **grid access** and connection for renewables can be a problem in some areas because of grid congestion. Examples include the **Eemshaven** (a

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7 In Dutch Regulerende Energie Belasting or REB. Besides the exemption, green electricity production was also additionally subsidized using the REB cash flows from fossil power distribution.

8 In Dutch Milieukwaliteit van de Elektriciteitsproductie or MEP.

9 Besluit Stimulering Duurzame Energieproductie. Staatsblad 2007 410.

10 Implementation of the Dutch Biomass Action Plan, for instance.

11 http://www.fibroned.nl/. The facility still is in the application process.

high concentration of fossil power plants) region in the north and **Westland** (high application of combined heat and power plants) in the west of the sovereignty.

1.1.2 Main regulations

The level playing field for renewables in the Netherlands is determined by the following five key regulations:

1. **Stimulering Duurzame Energieproductie**[9] (Subsidy for renewable energy production) abbreviated in Dutch as SDE;
2. **Regulerende Energie Belasting** (Regulatory energy tax) abbreviated in Dutch as REB[12];
3. **Duurzame Warmte**[13] (Regulation for renewable heat);
4. **Voorrang voor Duurzaam**[14] (Priority for renewables act);
5. **Rijkscoordinatie regeling**[15] (State coordination regulation).

The first three policies are supposed to remove the uneconomic top of renewable energy production. The SDE is mainly directed toward electricity production and grid injection while the heat regulation focuses on small-scale heat for the build environment (heat pumps, solar thermal boilers, etc. although excluding new constructions). The REB amendments no longer stimulate or affect the production of green electricity, but still have some impact on strategies for heat distribution.

All these regulations act on cost-barriers and are in principle not part of our study consequently. We will, nevertheless, include non-cost barriers with regard to the subsidy application process (amongst others technical specifications).

The fourth regulation should give priority to renewables in case of grid congestion. It is important in the sense that, although the SDE subsidy payments are per kWh actually injected into the grid, it can not be considered to be a feed-in tariff. In other words, the grid operator is not obliged by the SDE to procure the produced electricity. This new law - amending the Gas and Electricity Act of 1998[16] - should give priority access to renewables via another route. Unfortunately, it has not become effective yet and the recent fall of the government accompanied by new elections in June may lead to a political shift, the impact of it not known yet.

The last ruling procedure is an interesting one and places the spatial planning decision-making process of some projects at central government level. Besides, the Minister of Economic Affairs coordinates the licensing procedures. The aim is to simplify and streamline procedures, making such projects can be quickly achieved. For example, governmental decision power can be used in case a municipality refuses to cooperate issuing spatial planning or environmental related permits. Not all renewable energy

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12 http://wetten.overheid.nl/BWBR0007168/geldigheidsdatum_23-03-2010.

13 Duurzame warmte voor bestaande woningen. Staatscourant 29 december 2009, nr. 20455.

14 Kamerstuk 2008-2009, 31904, nr. 2, Tweede Kamer, for instance.

15 Uitvoeringsbesluit rijkscoördinatieregeling energie-infrastructuurprojecten. Staatsblad 2009 73. Also known as Rijksprojectenprocedure.

16 http://wetten.overheid.nl/BWBR0009755/geldigheidsdatum_15-03-2010.

projects are entitled: only wind energy from 100 megawatts and other forms of renewable electricity from 50 megawatts. An example of such a coordinated project is the 450 MW wind energy park **Noordoostpolder**[17] near the city of Urk. From an organizational point of view, this project is also considered to be "best practice" by some stakeholders. Others argue, however, its preferential SDE tariff[18] is discriminating.

Wind energy park Noordoostpolder:

The umbrella project includes a plan to build approximately 450 megawatts of wind in the Noordoostpolder. Along the embankments of the polder, both on land and in water, a total of five wind projects is being developed by the Koepel Windenergie Noordoostpolder (KPN). The three subprojects on the land, consisting of three straight lines have a combined capacity of 250 MW, and are placed along the ZuidMeerdijk, Westermeerdijk en de Noordermeerdijk. In the water two of the five sub-projects are planned with a total capacity of approximately 200 MW. The Koepel Windenergie Noordoostpolder is an association of local project developers, mostly farmers. The Koepel represents the common interests of the project partners for preparing an environmental impact assessment, for contacting governmental bodies and for seeking publicity.

1.1.3 Sources

This report is based on approximately fifteen interviews with project developers, manufacturers and installers in various RES sectors (mainly wind energy, solar energy and biomass). Furthermore, interviews with representatives of energy agency Agentschap NL, energy foundation Energy Valley and some associations were organized for verification and additional information.

We gratefully acknowledge all these stakeholders for their contribution.

[17] http://www.windkoepelnop.nl/.

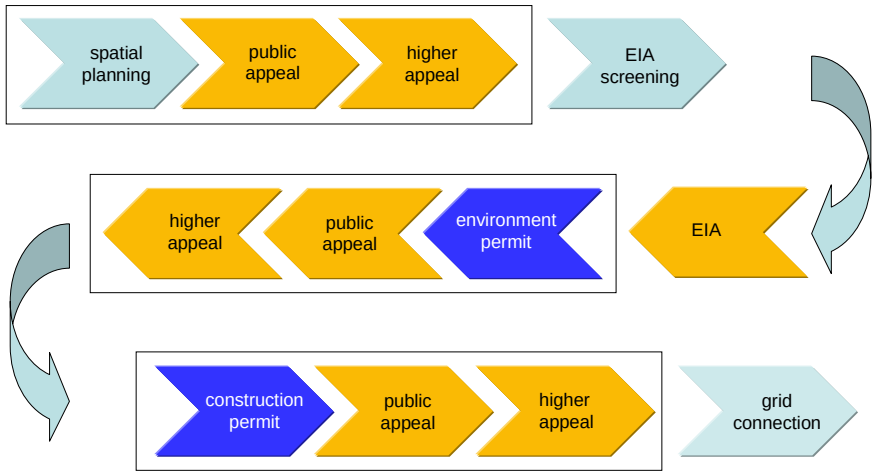
[18] Stimulering duurzame energieproductie. Tweede Kamer der Staten-Generaal 31 239, Nr. 76.

2 Issue 1 Administrative Procedures

2.1 Introduction

Administrative procedures appear to be a major issue in the Netherlands, in particular the strong opposition of the local population and the NGOs with regard to biomass and wind energy (both onshore and offshore) as becomes apparent by the large number of protests and legal cases toward permitting applications. The severity of the problem in general depends on the type of RES, its location and the scale of the project.

The Dutch RES permitting procedure typically looks as follows (the carroty procedural steps such as the Environmental Impact Assessment do not always appear):



As a result, in the Netherlands it is possible for a third party to object to either spatial planning (land use changes), environmental or building permits, what in practice is not an exception indeed. Moreover, in the Netherlands, an environmental permit is not effective without a construction permit and vice versa. The authority for the environmental permit usually is the province (regional level) or the municipality; for the construction permit the latter.

Besides the standard environmental and construction permits, sometimes more specific permits are required such as water, safety or disposal permits. Hence, on average two to three permits (corresponding with two to three different authorities) are required.

2.2 Description of barriers & solutions

2.2.1 Detailed description of the barriers and solutions

Barrier 1.1 – Inefficient general administrative procedures (including no/insufficient specific rules for building integrated/small scale RES installations)

The length and structure of the administrative procedures that have to be dealt with for the application varies per technology and the type of application that is sought to be implemented.

Solar energy installations (PV panels or solar boilers) are rather straightforward and do not pose particular difficulties from an administrative point of view. [19] Smaller types of solar panels can be installed at roofs of buildings without a building or environmental permit. PV installed on monumental buildings (or in another way decisive for the city view) however, requires a building permit[20]. For larger stand-alone PV applications (a few MW or over 200 m^2 for solar thermal) both environmental and building permits are necessary though this still is considered to be a formality only. It should be stated, however, that these kinds of projects in the Netherlands are located either on land fill or on flat roofs of major industry buildings thus preventing land use change issues. The general market perception on the need for permits is that this does not cause an excessive burden, although obtaining the environmental permit sometimes takes some time.[21]

For the use of **wind energy** the story is completely different. The administrative procedure for the installation of wind turbines can vary greatly and is depending on the location and the objections of local residents and lobby groups. The process can take six months in the best cases, but up to ten years in other cases. Moreover, the rejection rate for both on- and offshore wind parks is high.[22] Presently, most applications go to the Supreme Court[23] to get settled. For a good overview of the permitting process for onshore wind energy in the Netherlands (although somewhat outdated) we refer to the report by Koeslag.[24]

> In short, the author concluded that although the official term is frequently exceeded, many legal options for delay for the authorities are covered. It was even suggested that the duration of the construction permit is longer than that of the environmental permit; however, in the Netherlands the construction permit cannot be granted prior to the environmental permit.
>
> According to the report, the average lead-time of the total authorisation procedure is ~46 weeks[25]. For 10% of the (especially larger) projects, the lead-time is more than two years and the longest detected passage duration is four years. Considerable delays because of legal procedures are not very frequent

[19] With the draft environmental law change, which is scheduled on July 1, 2010 solar collectors and panels are allowed only without permission on the roof of a house be placed, and therefore no longer on the facade.

[20] http://www.vrom.nl/docs/wonen/folder_Zonnecollectoren_en_zonnepanelen.doc.

[21] Interviews with installers of solar energy and heat pumps.

[22] Interview with wind turbine manufacturer. Note that the situation for offshore is different since also the suitability of the location at sea is involved.

[23] In Dutch: Raad van State.

[24] J. Koeslag, Vergunningstraject van Windenergie, CEA, Rotterdam (2002).

[25] This excludes projects including a legal procedure. This procedure is ca. 85 weeks on average. Inclusion will increase the average lead time of the whole data set with 5 weeks.

but can certainly not be excluded. It should be stressed, however, that our respondents suggested that the values for the lead times of more recent projects are much higher.

Furthermore, a remarkable result was that the outcome of a project (success versus failure from the permitting perspective) depends on the land use approval only. The reason for a project failure is that the initiative does not fit in the land use plan and the responsible authorities refuse to cooperate in changing the plan.

Another specific barrier is that in case the permit procedure is time-consuming, the application procedure is insufficiently flexible to include technology changes. For example, outdated wind turbines had to be installed near Burgervlotbrug[26], a project that also took more than twenty years.

For **off-shore wind** parks, two wind parks were recently built in the Netherlands. These are the parks near Egmond aan Zee (Q8) and the **Prinses Amalia** Park (Q7), in both cases the permitting procedure continued near ten years (1996-2006 period for Q7).

In total there have been requests for permits for 74 locations to build off-shore wind parks in the Netherlands. Most of them where not granted, partly because the national government did not have a fixed plan to process the requests, five different ministries had to judge parts of the requests, or the coordination between the ministries was non-existent. Currently a taskforce of **Rijkswaterstaat** (under the authority of Ministry of Transport, Public works and Water management) has taken over the coordination of this process.

At the moment 12 projects were issued all permits; the reason for the rejection of the other 62 projects could be based on shipping interests, environmental protection zones, etc. The costs of the requests for the market players could be ranging from several hundred thousand Euros till amounts over 1 million euro. Costs evolve mainly from R&D costs, back office overhead hours and legal procedures.

The Ministry does have learnt a lesson; currently it is allocating areas within its territorial waters, where wind parks are allowed. Therefore it is now possible to apply for a certain area and get a fair process. In the **Nationaal WaterPlan** (NWP), potential areas for offshore wind are designated.

See for further information on bureaucracy the **Kafka brigade** documents of the **Stichting Natuur en Milieu.** [27]

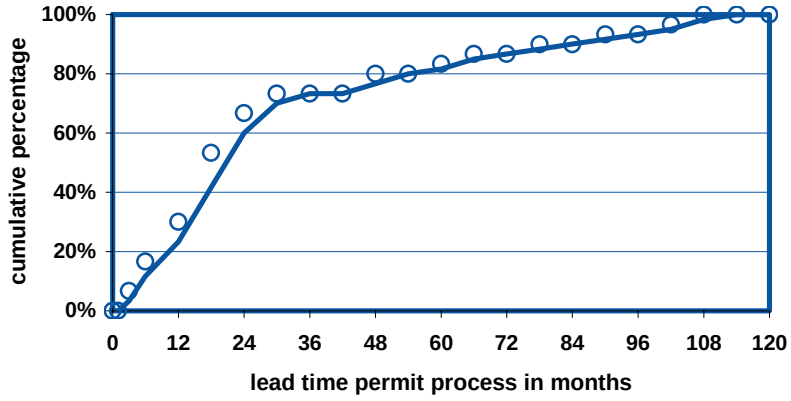
For the application of **heat pumps** there are restrictions. A barrier is that the regulations differ from region to region. For instance, for certain locations the soil drillings (for the pipes) have to be accompanied by specific drilling permits issued by the province. Areas close to natural water supply[28] are especially difficult to get a permit for. There exists a minimum threshold value below which there is no need for a permit: this flow threshold

[26] http://www.ecowind.nl.
[27] http://www.kafkabrigade.nl/home/nl/.
[28] In Dutch: *waterwingebied*.

value is currently set at 10m^3 of water per hour, but in certain area's there is also a maximum for the absolute number of hours per year the heat pump can be used. Different regulations exist per province. In the province of Limburg (in the lower south) there is a need for an environmental permit in 80% of the cases. Furthermore this is the province with the highest percentage of **restriction areas,** where soil drillings for the application of heat pumps are prohibited in all cases. No numbers are known for rejection rates.

In general, permits are a large obstacle for the wider employ of heat pumps as renewable energy source in the Netherlands. But a distinction can be made between the type of heat pumps and the amount of administrative procedures that needs to be dealt with. For the so called geothermal heat pump[29] it is relatively simple to get permission (an announcement to the authorities suffices). But for geothermal-water heat pumps[30] exceeding a water flow of 10m^3 per hour - which is necessary for the use of medium sized applications - it will take at least nine months to collect the permits required. Presently, it is expected to increase this threshold value to 30m^3 per hour by 1st of July 2010.

Finally, for the application of **biomass** for energy generation, there is a mixed view. The administrative procedures for the smallest projects (most often farm digesters or a few MW wood boilers or stoves) are not too complicated and the procedures consume a few months in most cases since no Environmental Impact Assessment is necessary. Broadly speaking, however, this assessment is necessary and the procedures are getting more complicated quickly. The majority of the biomass and waste projects is appealed to, most frequent by residents and NGOs, and face a subsequent legal case. Even stronger, the Netherlands is one of the EU countries facing the strongest opposition[36]: over ~90% of the projects are appealed to and ~27% encounter a legal case (higher appeal). The average lead time to collect all permits (for bioenergy) is almost 30 months; the lead time of many biomass projects, however, is much higher:



For an overview, we refer to the various specific bio-energy permitting monitoring reports of energy agency SenterNovem[31] on the issue. [32]

[29] In Dutch: verticale bodemwisselaar.
[30] In Dutch: grondwatersysteem.
[31] Recently changed its name to Agentschap NL.

Then there is also the use of **bio-oil** for transport. For this case on the production side no significant problems are experienced with regard to permits. Reason for this is that most bio-oils, such as Pure Plant Oil (PPO) have so-called **Water pollution class** 0[33], meaning that it does not impose any threat to the ecosystem. Even though this German certificate does not apply to the Netherlands, still the use of bio-oils does not have to be accompanied by permits.

However, this does not hold that there is no administrative barrier for the implementation of bio-oil product for transport use. On the contrary, at the filling station, if bio-oils are additional to other fuels, the whole environmental permit (authorized by the municipality) of the station has to be revised, which usually gives many problems. Therefore most stations do not consider PPO to be a viable addition to their product range.[34]

In sum, one-stop shopping in combination with a single procedure could help to reduce at least the number of moments within the permitting procedure sensitive to objections. The proposed solution - aforementioned **Rijkscoordinatieregeling** – only includes projects above 50 megawatts[35], though. A **solution,** of course, would be to lower this threshold or delegation of this procedure type to subordinate authorities. For **onshore wind** energy for capacities above five megawatts this already materialized by the introduction of the coordination regulation (*provinciale coordinatieregeling)* for regional authorities.

Barrier 1.2 – Inexistent or insufficient spatial planning

With the exception of **offshore wind energy,** the Netherlands does not designate specific areas for renewables. Hence, very often a land use status change for inclusion in the spatial planning is required. This is a time consuming process that can take several years but is on average circa 14 months for the Netherlands.[36]

As for **wind energy onshore,** main obstacle is including the wind parks in the regional spatial planning[37] of the municipalities. It can take years before municipalities are convinced to embrace wind energy in this plan, as citizens are allowed to object to the project plans for the wind turbines. A building permit is always required. In addition, above 15 MW an EIA is mandatory requiring a few hundred thousand Euros for the project developer. Sometimes even more permits are needed (in frame of Natura 2000 or water regulations, for instance). For the Eemshaven project in the North of the country (Groningen) over 200 permits were required. In France and Germany for instance, municipalities are required by law to dedicate space on their territory for wind parks, but in the Netherlands this is not the case, leading to long NIMBY (not in my back yard) legal procedures. [38]

There is also a difference in the length and structure of the administrative procedures between on-shore and off-shore wind parks. For off-shore wind parks the procedure is

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32 KEMA, 2008. Bio-energie in Nederland: monitoring vergunningverlening 2006 (i.o.v. SenterNovem). Februari 2008. Kema 2006. Bio-energie in Nederland: monitoring vergunningverlening Wet Milieubeheer 2005, etcetera.

33 In German: Wassergefährdungs Klasse of 0.

34 Interview with PPO supplier.

35 And over 100 megawatts for wind energy projects.

36 ec.europa.eu/energy/.../ecofys_final_report_benchmark_bioenergy.pdf.

37 In Dutch: Bestemmingsplan.

38 Interviews with wind energy project developers.

likely to be longer on average, but it better structured as there are mainly (larger and more experienced) governmental parties involved in the process.

The erection of **biomass** facilities most often requires a land use change, which can take considerable amounts of time, especially when objected by stakeholder groups. Hence, some companies choose to locate their biomass converting installations at dedicated heavy industrial areas (so-called category 3+ sites), where getting the necessary permits is less likely to be a problem. On the other hand even in these cases, in the past there have been problems in getting permits and/or subsidies for projects.

For any RES based power, it could be necessary to create additional capacity at the **grid network.** For this sometimes permits are required by the municipality; more often it is about licensing, the right to build.[39] The TSO is responsible for this matter, however does not consider permitting to be a problem issue in the process. One can also think about a notification[40] for excavation work near pipelines and cables. Depending on the type of owner this can be a time consuming process.[41]

Barrier 1.3 – Competing public interests

The Netherlands is one of the countries with the highest public opposition. Almost every biomass and wind energy project is subject to appeal. This not only follows from our interviews, but is also evidenced by research as described above. Also public bodies like municipalities sometimes object.

A possible **solution** would be to include local stakeholders like residents financially, e.g. by local co-ownership, in particular for wind energy. An example of this is the innovative (from a marketing and financing point of view) offshore wind **Zeekracht** project. [42]

Barrier 1.4 – Other Barriers

For **solar energy (PV),** the main barrier on this point is the lack of European harmonization of subsidy regulations and a fragmented use of the grid network. Solar module and system manufacturers experience a barrier linked to different regulations in the various EU countries. Moreover, it takes quite some time to get to know the local regulations (legal issues, notary, mortgage options, etc.) for support and permits. Besides governmental regulations, financial regulations also differ. This leads to the fact that it is only useful to export to large markets, however smaller markets such as the Baltic States are not interesting, because the administrative burden is relatively large compared to the possible cash flows that can be generated from business. [43]

In general, within the Netherlands, there is a need for a synchronisation of all these administrative processes, many of them can possibly be cut. Therefore, it first has to be assessed, which regulations are in place and at what institutional level, then it can be decided which part of the administrative procedure can be skipped. After a thorough synchronisation within the Netherlands, and also other countries in the EU, there is a need

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39 i.e. in Dutch: Recht van opstal. Interview with TSO.
40 In Dutch: grondroerdersrecht.
41 Interview with TSO.
42 http://www.zeekracht.nl/.
43 Interviews with solar cell manufacturers and project developers.

for a harmonisation between the regulations between the EU countries. Creating tailored regulations for all types of (biomass) applications and equally important, creating a level playing field between the different countries.

2.2.2 Best Practice Elements and Indicators

The **Rijkscoordinatie regeling**[15] is frequently referred to as a best practice.

No.	Benchmark	Result
1.1	Is one stop-shopping possible?	No, for projects over 50 MW only
1.2	Amount of money to be invested in the administrative process (including cost of work and costs like fees) (in €)	N/A
1.3	Time to be spent for the administrative process (duration to get all the main permits) (in months)	Between 1 and five years
1.4	Estimated number of permits required (#)	2 to 5

3 Issue 2 Technical Specifications (for support)

3.1 Introduction

In most cases, it is clear to which institution you should go and what you have to do to obtain the technical specifications to be able to apply for subsidy. In general, only limited specification requirements exist: no minimum thresholds for biomass (in terms of conversion efficiency or CO_2 emission reduction), wind energy or solar cells (in terms of conversion efficiency) or heat pumps (in terms of COP-value) exist. The single exception is energy production from **waste incineration.**

3.2 Description of possible barriers & solutions

Barrier 2.1 – Weak definitions

In the case of **green gas**, it is necessary to get it upgraded to natural gas standards. Furthermore, there is a white list[44] for all types of feedstock (energy crops, organic residues, etc.) entering the production process, however not all definitions on this list are clear. Moreover, it seems possible to process input products to better meet the needs of the list. Actually, some people even died because of the application of products that were not allowed. [45]

Barrier 2.2 – no EU standards applied

The main barrier is linked to registration issues. Various types of products (equipment and/or feedstock) have to be on an official list in order to be eligible for subsidy. These lists are quite specific and established by the (Dutch) authorities. In other words, a national or even European wide accepted key mark or standard may not suffice.

As mentioned above for **biogas** there is a white list for all feedstock entering the production process. The types of feedstock on these lists vary from country to country; we do not know if a European white list exists.

Solar boilers and **heat pumps** have to be on the official "Energy list" of SenterNovem, which causes several problems most often for SME companies and/or new products. [46] For instance, different lists exist for the regulation for sustainable heat and the EIA,

[44] Positieve lijst co-vergisting: http://wetten.overheid.nl/zoeken_op/BWBR0018989/bijlageAa/tekst_bevat_bijlage%2BAa/geldigheidsdatum_23-03-2010.

[45] http://www.energierecht.nu/www.delex-backoffice.nl/uploads/file/vrom%20covergisting.doc.

[46] In addition, micro Combined Heat and Power is listed, but this technology strictly speaking is not a RES technique *per se*.

which is an investment compensation scheme. There is a need for synchronisation of all lists.

In the specific case of heat pumps, for instance, there is a need to test the product in order to apply for subsidy. Prerequisite for subsidy eligibility in this case is that the specific type of heat pump must be on the list. This requires, however, a product to be tested by a certified institute. The costs for this certification test are as high as € 10.000 per test.

Additionally, each slightly smaller or bigger heat pump of the same product range has to be put to the test separately. For example, all products of a product line between 3 and 40 kW have to be tested whilst the only variation is the power. This results in that for some types of heat pumps no tests – and consequent no subsidies and application- are available, as in the Netherlands almost no manufacturers are able financially to test all their products.[47]

For solar thermal, in order to be eligible for subsidy, the solar domestic hot water system should meet the quality requirements set in the EN norms EN 12975 and EN 12976 (standards for solar collectors and factory made systems).

Barrier 2.3 – Specified locations for testing and/or certification
No barriers detected.

Barrier 2.4 – Barriers to trade
No barriers detected.

Barrier 2.4 – Other Barriers
In frame of the SDE regulation, producers of renewable electricity or gas from fermentation **(biogas)** and thermal conversion (incinerators) of **biomass** are required within three months after the calendar year to report on the sustainability of the deployed biomass. This means that, for instance, plants using primary vegetable oils and fats, fatty acids and glycerine (NTA[48] 8003: 2008 NTA 500, 550 to 559, 587 and 592), pending a further elaboration of sustainability criteria by the SDE officials, are not eligible.

Furthermore, the capacity of thermal conversion of biomass is limited to 50 megawatts. Finally, specific for (organic fraction of) waste incineration, the SDE requirement is a minimum monthly adjusted efficiency of 22 percent.

For **onshore wind energy,** respondents actually prefer to have some kind of efficiency benchmark: unfortunately, the present SDE regulations stimulate installed capacity, not efficiency or produced MWh as a point of reference. Further, there is no tariff distinction between areas near the coast and inland.

[47] Interview with Dutch heat pump supplier.
[48] In Dutch: Nederlands Technische Afspraak.

3.2.1 Best Practice Elements and Indicators

The factual use of (mainly small) **solar thermal** applications in the Netherlands is quite large, with over 100.000 systems installed. In the subsidy granting scheme the energetic performance of the system as a whole is assessed (rather than squared metres) which is to be preferred above the assessment of different components.

No.	Benchmark	Result
2.1	Are specifications expressed in terms of European standards (including eco-labels, energy labels and other technical reference systems), though such European references exist?	Yes

4 Issue 3 Building integrated technologies

4.1 Description of barriers & solutions

For the Netherlands most important RES within the build environment are the use of solar panels, solar hot-water heaters and (closed-loop) heat pumps. The use of pellet stoves or turby's (small-scale wind) is not widely spread yet.

4.1.1 Detailed description of the Barriers and solutions

Barrier 3.1 – Inefficient general administrative procedures
No barriers detected (for build integrated technologies).

Barrier 3.2 – No/insufficient specific rules for building integrated/small scale RES installations
The subsidy regulations benchmark for small-scale wind turbines (< 25 kW) is a stand-alone park instead of the build environment.

Barrier 3.3 – Competing public interests
No barriers detected.

Barrier 3.4 – Renewables obligations insufficient
At present, there is no obligation or legislation to implement the use of any renewable energy building integrated technology.

A solar panel manufacturer shares the following opinion on the implementation of RES (in this case solar applications) in the Netherlands:

> Without the (SDE) subsidy it is not economically feasible to invest in PV systems. Other regulations like the Energy Performance Standard[49] (EPC as determined by the building regulations) are not strong enough to stimulate the application of PV. There are initiatives by housing corporations to equip their houses with solar panels, but this is mainly based on goodwill or obtaining an environmental friendly image. Housing corporations in theory are eligible for SDE subsidy, but the subsidy system in the Netherlands can be described as a lottery, where no sound investment decision can be based on (the per year cap of ~5 MW is quite low). There are also a few municipalities that have developed a subsidy system on their own, being Goes, Venlo and the province Friesland, for instance. This could be considered as 'best practice'. [50]

[49] EPC in Dutch is Energie Prestatie Coëfficiënt.
[50] Manufacturer of solar cells.

In frame of the transition process, the build environment transition platform[51] recently initiated the debate on how to formulate obligations for the build environment. [52]

Barrier 3.5 – Exemplary role of public buildings neglected

Various exemplary buildings exist, most of them equipped with solar cells. Although somewhat outdated, a good example is the sunroof at the **Floriade 2002** event. In that year, the event took place in the village Vijfhuizen, municipality of Hoofddorp, close to the Schiphol Airport. A roof that acts as a giant 2,3 megawatts solar panel with an 30,000 m^2 area comparable to three football fields. At the time it was the world's largest building integrated solar plant. The roof consists of nearly 20,000 special semi-transparent solar panels. This unique translucent film creates a pleasant atmosphere.

With regard to biomass, there a few bio-oil fuelled combined heat and power plants for swimming pools and other types of recreational areas. Examples include the **Tongelreep** Eindhoven and **Calluna** Ermelo.

Barrier 3.6 – RES deployment hindered by spatial planning matters

The lack of designated areas and planning prior to area development is considered to be a barrier. Most often, zoning does not take into account underground storage tanks and/or heat pumps; construction does not take into account the position of the sun, et cetera.

Barrier 3.7 – Tenancy law and ownership law impedes development of Building Integrated RES technologies

When the rent includes the energy costs, an option would be to increase the tenant rent upon investing in RES. In the Netherlands, however, the rent is established by a value that is determined by a complex formula of summing points reflecting amongst others the size, the location and the level of quality of the dwelling.[53] Unfortunately, energy efficiency is not included in this number thus hindering investments.

The system may change soon with the new housing valuation regulations stimulating energy efficiency and renewable energy using the energy label (see next Chapter) as an instrument. [54]

If the tenant rent is exclusive of the energy costs, no incentive for investments exists anyway.

Barrier 3.8 – Other Barriers

A respondent mentioned flat roofs encompassing substantial surfaces may not be able to carry the load of the photovoltaic panels. This could be mitigated by either application of thin films or by adaptation of the building regulations.

[51] http://www.senternovem.nl/energietransitiego/index.asp
[52] http://www.pegocongres.nl/
[53] In Dutch: *huurpuntenstelsel* or *woningwaarderingstelsel*.
[54] Voor meer informatie zie de brief van de minister aan de Tweede Kamer van 2 juli 2009.

A very specific barrier, which is worth mentioning, is the fact that solar panels quite frequently are stolen in the Netherlands (probably also in other countries). The panels are simply reinstalled on the roof of the **new owner.**

4.1.2 Best practice elements and indicators

What is frequently mentioned is the **City of the Sun**[55,56] integrating the municipalities of Heerhugowaard, Alkmaar and Langedijk in the northwest part of the country near the coast. It is a huge solar (both thermal and electricity) project for at least 2,900 carbon neutral dwellings summing up to over 5 MW of photovoltaic panels generating over 3,750,000 kWh per year:

Other exemplary projects (also in the private sector) can be found under PV Info: http://www.pvdatabase.org/.

Furthermore, some municipalities offer exploitation subsidies themselves, stimulating mainly photovoltaic applications in the build environment.

No.	Benchmark	Result
1	Is this installation type in normal cases exempted from an authorization procedure (building permit)?	Yes†
2	Are legal-administrative requirements adequate for this installation type?	No
3	Is there a Renewables Obligation that operates sufficiently?	No
4	Number of administrations that must be contacted	Usually none

†With the exception of heat pumps, depending on type and region/municipality. Further, with the draft environmental law change, which is scheduled on July 1, 2010 solar collectors and panels are allowed only without permission on the roof of a house be placed, and therefore no longer on the facade.

55 In Dutch: Stad van de zon.

56 http://www.vrom.nl/pagina.html?id=44092.

5 Issue 4 – Promotion of energy efficient renewable energy equipment

5.1 Introduction

In the Netherlands, energy efficiency labels, certificates or standards are in place for various technologies. However, often they are in compliance with branch or domestic principles, instead of European standards. For **heat pumps,** various competing key marks confuse the market.

A representative Dutch example is the so-called **energy label.** [57] This label for dwellings lists classes (A to G) and colours (green to red) on how energy efficient a home is compared with other similar houses. Grade A (dark) is economical; energy label G (red) is inefficient. Because of the energy label, one can see at a glance if a house is efficient or inefficient compared to other homes of the same type. Although the instrument aims at energy efficiency, the application of build integrated RES improves the label value as well.
The expectation is that homes that are more efficient are easier sold or rented, and that their worth increase. This is an extra reason to invest in energy efficiency or renewables. Since January 1st 2008, sellers and property owners of housing have to prove an energy label. Findings, hitherto, are ambiguous though, in particular because there are no sanctions yet for not complying. With it's first introduction the energy label was not popular at all, most of the techniques for energy efficiency and renewable energy were not calculated in the right way. A new label is introduced half 2009. So, finally the energy label itself is a good instrument, but it is not effective yet because almost no one uses it .

In the past, to promote efficiency (and their environmental impact and safety) of hearths, a key mark by research institute TNO was standard. Unfortunately, it turned out that the key mark was not in line with European regulations (it prevented free trade), though, and was abolished in 2005.

[57] http://www.energielabel.nl/.

5.2 Description of barriers & solutions

5.2.1 Detailed description of the Barriers and solutions

Barrier 4.1 – Non-compliant promotion schemes

For **solar boilers** and **heat pumps,** the Energy Performance Certification Foundation[58] (EPK Foundation) has been established on the initiative of the Dutch heating industry and Gastec Certification BV (so not on the initiative of the government). The EPK Foundation, however, does not promote energy efficiency or renewable energy; they only hold the key marks and on their website the information on the key mark can be found.

For heat pumps there is a need for certification to apply for subsidy. Currently, the EHPA is developing a certification scheme for installers. There are also European based heat pump certifications; the DACH-Gutesiegel has been developed into a European wide acknowledged certificate (EN14511). However, this certificate is still not acknowledged by Dutch law.

Finally there is the KOMO key mark[59] for build integrated technologies, but this is not specific for renewables.

Barrier 4.2 – Lack of substitution of existing inefficient systems

As there are no regulations in place regarding the energy efficiency of the RES application, there is made no distinction between efficient and inefficient systems. Both efficient and inefficient RES systems are currently available and operating in the Netherlands, in theory inefficient systems could be replaced by more efficient systems, however there current regulatory scheme there is no way to safeguard this, on the contrary both efficient as inefficient systems have equal changes to receive subsidy. This can be considered as a disadvantage for companies who spend more effort in their R&D process in order to make a quality RES system.

Barrier 4.3 – Use of national procedures

Further, we refer to Section 3.2 on the Energy list.

Barrier 4.4 – Insufficient information

No barrier detected.

Barrier 4.5 – Other Barriers

As for **biomass liquids** there are also specific prerequisites to the registration of the product that is being produced to generate electricity from. The product registration programme is called REACH and it is a European programme (Registration, Evaluation, Authorisation and Restriction of chemical substances). The costs for this test and registration are about € 400.000. In the case, for instance, that a second company will also produce the same product, this company will have to share in these costs and the first mover company will receive € 200.000 back. Still, the costs that have to be made in order

[58] http://www.epk.nl/.
[59] http://www.komo.nl/a/default.asp.

to create an operating biomass installation are high, as these certification costs are just fractional to the total investments.

Furthermore, there is often discussion about the input products for biomass oils. To illustrate, in a certain case the main input product was waste wood, which is considered a waste product. Hence, in principle the installation that is processing the wood will have to meet the disposal requirements, for incinerating waste products. These requirements are too costly to make any bio-oil installation profitable. Therefore, it is necessary to get a product rather than a waste status for the oil, the installation wants to produce. If this succeeds, the installation will fall under the "BEMS" (*Besluit Emissie-eisen Middelgrote Stookinstallaties*) regulation, with standard emission requirements the installation can meet. Main problem in this process is finding the authority that is responsible for issuing the product status for the bio-oil. The company perceives this process as vague and it is not clear where to get the information or the necessary product status. (Ref: BTG).

When we look at the need for certifications for biofuels the so-called DIN norm is leading. Presently, the DIN norm (DIN 51605) for biofuels applies and is now being transposed to a NEN norm, commissioned by an EU Member State consortium and facilitated by European funding. However, not all fuels that are currently on the market fulfil this norm. New biofuels emerge including animal fats being not free of bacteria, even after the ester process. Using these fuels can result in the growth of algae in the tanks and pipelines of petrol stations as well as vehicles. This leads to technical problems, and complaints. Still animal fat based oil is used, adding it to fossil fuels. In fact, the RED 2009/28/EG favours this contribution to the biofuels blending target obligation as it may count twice in reaching the targets set (since they are considered to be waste streams). A **solution** would be to have mandatory standards.

As aforementioned, with regard to **wind energy onshore,** present SDE regulations stimulate installed capacity, not efficiency or produced MWh as a benchmark.

5.2.2 Best Practice Elements and Indicators

For **solar thermal**, the Dutch **Zonnekeur**[60] keymark could be considered best practice, since the whole system (both the collector and water storage) is assessed rather than individual components. A disadvantage of this keymark may be that foreign new market entrants have some disadvantage in understanding the specifics of this keymark.

No.	Benchmark	Result
4.1	Are the requirements of Art 13 (6) of the Directive concerning the promotion of efficient bioheat and heat pumps fulfilled?	No

Not for bioheat.

[60] http://www.epk.nl/keurlabels.asp?pid=8&subafb=True&sid=22.

6 Issue 5 Information/awareness raising

6.1 Introduction

In general, information and awareness in general do not pose a strong barrier in the Netherlands with the exception of bioenergy. Consumers usually are informed (although very passively) by Milieu Centraal[61] and Postbus 51[62], while the commercial sector and the local authorities typically are assisted by officials of Agentschap NL [63] (formerly known as SenterNovem). Driven by marketing, the energy distribution companies - although for obvious reasons less unbiased - play a role as well in informing the end-consumers. According to the branch, too much information focus in on the subsidy regulations and lack of (governmental) awareness programmes is a problem, indeed.

The advantages of RES are understood by the population, however the implementation schemes in place to implement are difficult and the procedures tend to change every few years. Therefore the knowledge of the procedures to implement RES applications is low and this forms a barrier for the implementation of RES. Respondents mention that the solution for this problem is not extra information, rather they see a simplification of the procedure for permits and subsidy applications, as well as an upgrade in the knowledge about RES with civil servants, who have decision making power.

Information and awareness raising is very important for **biomass** to become a serious source of energy. An option is to establish a knowledge database to increase the knowledge that civil servants have on the procedures, and technical specification and (technical) possibilities of biomass sources for energy generation. This is an important step, because at present most civil servants do not have an overview of the broader picture of the administrative procedure, they confine themselves to the small piece in the administrative chain they are responsible for. Moreover, increasing their technical knowledge could improve their reference framework in which they make their binding decisions.

Another technology for which a higher level of information is required still is **solar thermal**; many residents confuse solar boilers with photovoltaics, the latter encompassing more awareness among the community.

It is also important to raise awareness at the general public. It is the government who decided that RES are the future for the Dutch energy policies. It reduces climate change,

61 http://www.milieucentraal.nl/.
62 http://www.postbus51.nl/. This channel, however, does not cover all RES technologies.
63 http://www.agentschapnl.nl/.

provides job creation and reduces the dependency on foreign energy imports. Now it is time that the government starts to facilitate the use of biomass for energy generation, instead of making the procedural framework hinder business initiatives.

6.2 Description of barriers & solutions

6.2.1 Detailed description of the Barriers and solutions

Barrier 5.1 – Insufficient availability of information on support measures & of guidance for planners and architects

For **solar energy** there is one point that needs further implementation, the interviewees mention that the majority of the customers do not know enough about the costs and revenues of solar panels. This holds for both individual customers and companies. Therefore, clients can easily be misled by **cowboys,** who intentionally misinform clients in order to increase sales. Clients can for instance be misinformed about how to provide electricity to the network in summer and make use of a heat pump in winter (while there is a mismatch in production and consumption). Arranging obligatory certification, in particular embedded in the legislation, and training for installers could be a solution (see also Barrier 6.1). However respondents indicate that there is more need for easily accessible information sources where clients can inform themselves about subsidies and application of solar panels. So they know what to ask and can tell when they are being misinformed.

Barrier 5.2 – Insufficient public funding for campaigns/programmes

In the case of **wind energy,** no coordinated public campaigns to inform about the possibilities of wind parks exist. Respondents mention that the public does not know enough about wind energy. Wind energy is the cheapest source of RES and accounts for over half of the Dutch renewable energy production. Still the public opinion does not favour wind energy compared towards for instance solar energy. There is also a big difference in perception between off-shore and on-shore wind parks. The public opinion clearly is in favour of offshore. There is a large NIMBY effect with on-shore wind parks. However the development of off-shore wind parks is costly and prices per kWh renewable energy produced on-shore wind parks are more economical. Lobby associations are plenty within the wind energy branch, however they are very fragmented in nature, off-shore and on-shore wind parks have separate associations and also the Ministry of Economic affairs has on own public association. It is argued that there is a need for a common “marching route” to catalyze the implementation of (off-shore) wind energy use. There is a lack of leadership from the Ministry.

In case of solar energy, the Netherlands participate in The European Solar Days. This is an awareness campaign for solar energy. However this is fully paid for by the market. So no governmental finance or other stimulating or promoting role from that side.

The knowledge of PPO **biofuels** with the general public is poor. Reason is a lack of communication on the promotional side and a non-cooperative attitude of the central Dutch government towards alternative fuels/and alternative fuel structures, not complying

with their own interests and/or current established structures and interests of the dominant fuel suppliers.

> A respondent suggested reason for this is a strong resistance of the well organised fossil fuel companies and partly also food producing multinationals. The food producing companies wish to remain the only buying party at the farms and farmers corporations. Encountering new players from the energy field on their dominated playing field will undermine their bargaining power. The resistance from the oil industry is even stronger, using subtle instruments, to delay, hinder and harm a new emerging "competitor". The renewable Energy Directive is very clear in the targets that are set for the implementation of renewable energies in Europe by Europe. However the oil industry induces the governmental authorities to meet these criteria by importing more fuel products, such as palm oil and soy oil, often produced in a non-sustainable way. This now has as a consequence that a new developing industry of rapeseed production with a positive effect on European rural/ regional developments is prevented from taking shape.

Exporting countries also subsidize their production of soy and palm oil. In this way they are 200-300 EUR/ton cheaper than domestically produced PPO.

In Sweden as an example, they already produce 28% of there energy needs using home-grown renewable energy sources. However the type of crops that farmers cultivate on their fields is also dependent on the agricultural policies/ circumstances in each respective country. In the Netherlands two harvests of crops are possible each year, however there is a policy that after September 1st it is not allowed to fertilize the soil with organic fertiliser, this will hamper winter grown rapeseed, whereas in other countries this is no objection to do so. In this respect the rules in the EU need to be more uniformly applicable. According to the respondent, Europe can be self-sufficient in food supply and still be able to generate minimal 20% renewable energy up to 2020 if including neighbouring countries like the Ukraine and Belarus this percentage can even be raised.

The general population in the Netherlands is also not aware of the advantages of PPO. The government should inform the consumers about the RED and how PPO for instance can meet the needs for this directive. SenterNovem, the Ministry of Environment, the Ministry of Economical Affairs and the Energy transition programme, has not been helpful or in the least productive in catalysing growth in the renewable energy sector, up to now.

The current problem for the biomass industry is that it cannot compete with the well organized and established of the oil industry. Biomass is produced by farmers, small individual companies, who are not organized in a larger organization but together do hold a solution in meeting the RED by the use of biomass such as PPO. The Ministry of Agriculture does not play a prominent organizing role in this, whereas Germany and France have a more active approach in promoting the possibilities of biomass.

Inside the Dutch ministries quite a number of individuals have a background in the oil industry, including prominent Members of Parliament and former Ministers, resulting in ambivalent approach to the implementation of renewable energy. The energy tax on LNG (a fossil fuel) was lowered from € 0.14 per to € 0.03 per litre, whereas in all aspects PPO

is considered a “mineral oil” and be taxed accordingly ,and as a renewable/ cleaner fuel is discriminated.

Barrier 5.3 – Insufficient campaign-/programme-design
According to the branch, the lack of a public service promotional campaign aimed at energy efficiency and renewables is a barrier.

Barrier 5.4 - Other barriers
Hitherto none.

6.2.2 Best Practice Elements and Indicators

No.	Benchmark	Result
1	Is sufficient information on support measures available?	No

7 Issue 6 Certification of installers

7.1 Introduction

A distinction can be made between certification for installers and the need for certifications of the product itself. A certification for installers with regard to renewable energy on the initiative of the government does not exist in the Netherlands.

According to many respondents, a certificate for installers is not wanted either, adding to the administrative load as described under the first issue. According to officials, however, quite often problems do occur during installation of in particular heat pumps and solar thermal boilers and photovoltaic installations and certification is crucial. Further, end-consumers may feel insecure in case of problems since an independent authority or intermediary is lacking.

7.2 Description of barriers & solutions

7.2.1 Detailed description of the Barriers and solutions

Barrier 6.1 – Lack of a certification body
Presently, no official certification body (or bodies) is in place. Currently Holland Solar, branch organisation Uneto-vni and Agentschap NL, targeting on improving installation quality of both photovoltaics and solar thermal, are developing the “masterplan Zonne-energie”. According to the national energy agency, various installations (ranging from 20% to 30%) do need quality improvement, indeed. Besides certification the plan will focus on training and education; a specific key mark for Photovoltaics will be developed as well.

Barrier 6.2 - Lack of guidelines
The installers of any RES type do not need to be certified, therefore there are no guidelines for this certificate. Installers are appointed by the installing companies and this is the main quality assurance for the installers to deliver quality in their work.

Barrier 6.3 - Lack of training
Installers have had an educational background as training for their work, and get additional internal trainings provided by installing companies if the nature of the work or RES product calls for this. There are no governmentally driven training campaigns.

Barrier 6.4 - Other barriers

It is mentioned[64] that not so much installers, but designers of heat pump/aquifer systems should be certified. Mistakes in the design of the buried pipes and heat-exchanges are virtually irreparable. Further, an independent authority could be helpful intermediating the consumer and installer.

7.2.2 Best Practice Elements and Indicators

No.	Benchmark	Result
6.1	Are certification schemes or equivalent qualification schemes available for installers?	No
6.2	Is sufficient training on RES provided during the standard education curriculum of installers?	No

[64] Interview with installer (anonymous).

8 Issue 7 Infrastructure Development

8.1 Introduction

This barrier is a major issue for the further implementation of RES in the Netherlands. In short, the national TSO argues that in many cases there is a need for further capacity on the grid network in order to be able to provide transport capacity. This holds that investments need to be made and that there has to be dealt with building permits and regulations. This can be a costly and time-consuming practice. Based on our interviews regions that may suffer from congestion are:

- The Northeast of the Netherlands around Eemshaven (Province of Groningen);
- Noordoostpolder (Province Flevoland);
- Maasvlakte (coast of Rotterdam);
- Het Westland (Province Zuid-Holland);
- Borsele and Kreekrak (Province Zeeland);
- Province Friesland;
- In general, areas including high concentrations of green houses (Venlo, Breda, Bommelerwaard, Uithoorn, and etcetera) since they often include quite some decentralized combined heat and power plants.

By law, the grid operator is obliged to conclude a grid usage contract with the plant operator. From an abstract point of view, the contract on access to the grid and grid usage between the plant operator and grid operator may also include the plant operator's entitlement to grid expansion, if this is necessary to guarantee access to or usage of the grid. However, apart from rights deriving from the contract, the plant operator is not entitled to grid expansion on the part of the grid operator: the grid operator is obliged to expand his grid according to general principles, instead. [65]

As aforementioned, electricity from renewable energy sources is not given priority like e.g. in terms of entitlement to purchase. This may change when the new regulation Priority for renewables comes into force. Nevertheless, the precise impact of the regulation and its congestion management clause on the RES sector is not known yet.

[65] Art. 16 Elektriciteitswet.

8.2 Description of barriers & solutions

8.2.1 Detailed description of the Barriers and solutions

Barrier 7.1 - Problems concerning development of electricity network infrastructures according to a long-term strategy

For the mid-term development of the grid network in the Netherlands, there is a **Quality and Capacity plan 2008-2014** available[66]; this official document also describes the need for transport of RES generated power to the national transmission grid. For the long-term, in frame of ENTSO agreements, a 10-year development plan is available as well.

Even though a plan for safeguarding grid access and providing transport capacity is available, in practice the producers of RES based energy at present do notice that there are serious difficulties in the infrastructural sphere, leading to a limited transportation of RES based electricity on the grid network. This is caused amongst others by the capacity plan **lagging behind**: according to the sector, the grid development is too slow and not all new projects (in particular decentralized power) even if already included in the spatial planning are integrated in the plan.

Barrier 7.2 - Problems concerning grid expansion processes of existing electricity networks

For the main high-voltage network there is reserved capacity for the 6,000 MW **off-shore wind** parks that are planned at the North Sea., however in some places there is congestion. Therefore it is important to construct several access points from the wind parks at sea towards the grid network at land, to distribute the power evenly. Wind park **IJmuiden** can have access at the Corus steel plant high-voltage transmission system, whereas projects in the Province of Zeeland and the Rotterdam area can have access at **Borsele.** Another wind park at the **Waddeneilanden** to be developed later on could get access at **Eemsmond** - this access point is currently being reinforced by the national TSO.[80]

Barrier 7.3 - Problems concerning development of a Trans-European Electricity Network

Examples include turbines near the border: in case the Dutch grid is congested, it is not possible to plug into the German grid, for instance. In general in the next coming years no major problems are expected. Some DC lines like the Norned cable have a stabilizing effect on intermittent sources.

[66] Kwaliteits- en capaciteitsplan. See www.tennet.org/.../kwaliteit.../Kwaliteits_capaciteitsplan.aspx.

8.2.2 Best Practice elements and Indicators

No.	Technology	Benchmark	Result
7.1	Wind onshore	Presence of an efficient (in terms of capability of achieving its stated objectives) plan for the reinforcement of the interconnection capacity with neighbouring countries.	Yes
	Wind offshore		No
7.2	Wind onshore	Presence of an efficient plan for the reinforcement of the connection capacity within the country.	Yes
	Wind offshore		Yes

9 Issue 8 Power Grid Issues

9.1 Introduction

In general, with the exception of offshore wind-energy, the actual grid connection is not considered to be a strong obstacle. However, various respondents indicated grid power access issues constitute a major barrier for the implementation of RES based technologies in the Netherlands, presently. Conversely, the extent of the barrier strongly depends on the technology and the region.

In the Netherlands, for projects below 10 megawatts, the DSO cannot cover grid expansion investment costs from increased transport tariffs; a regulation including a method of distributing these costs over e.g. all grid operators is lacking.

9.2 Description of the barrier

9.2.1 Detailed description of the Barriers and solutions

Barrier 8.1 - Problems concerning grid connection

According to the TSO, obtaining grid access is not a major issue but providing the transport capacity can be a potential problem in some areas, depending on the remaining capacity on the network. However, some producers and installers of different types of RES mention that also the grid connection itself can pose a problem. The extent to which this is an issue depends on the type of RES.

Looking at e.g. **bio-energy** and **onshore wind energy**, below 10 MW grid, connection and additional transport capacity must be granted by law without any restriction within 18 weeks. Above 10 MW, connection is not obligatory in case of insufficient capacity. This, however, may lead to a suboptimal solution; e.g. four turbines of 3 MW have a disadvantage. The grid connection has to be paid for by the company who owns the wind park (biomass facility) and wants to get access to the network to distribute their electrical energy. The amount of this charge is determined by the **Tarievencode.**[67]

By law, below 10 MW the distance for the DSO to connect has to be as short as possible: in case the accountable DSO cannot provide sufficient transport capacity at the entry point, it cannot cover the additional grid expansion investments (or longer connection

[67] Art. 23 Abs.1 i.V.m. Art. 27 ff. Elektriciteitswet.

cables) from increased transport tariffs. A **solution** would be a regulatory system that states how to distribute additional costs over all grid operators, for instance.

For **off-shore wind** parks the connection costs can be really high, especially when the parks are located far from the coast, although a compensation rule does exist for the present tender. Previously, the project developers had to pay by themselves for the connection towards the grid network at land. However, nowadays the national TSO of the Netherlands has agreed to make a grid access point at sea to where it is only a short distance for the project developers to construct a connection. The costs for these developments are being socialized and transferred to the end users

Barrier 8.2 - Problems concerning grid access

As aforementioned, renewable electricity does not have grid access priority. Furthermore, many respondents have the impression that reinforcing the grid network and providing transportation capacity does not have a priority among the national TSO and regional DSOs. The further development of this issue will largely depend on the implementation of the regulation Priority for RES[14]. In case this regulation will not be implemented then there will be a problem for the use of renewable energy sources. For this reason, the TSO now also proposed an alternative for the regulation, being a code change to the Dutch government in December 2009, referring to giving priority to "electricity systems that can not be regulated".

For **solar energy** applications the problems are least severe; most PV systems are installed "behind the meter", meaning that they will generate electricity in a closed local system, not affecting the general electricity network. Solar energy is used spread out in the country and is often applied to a certain building or area. Even bigger solar projects are often divided into smaller subsections and therefore are easily absorbed by the grid network. Having said that, some larger systems need interaction with the grid network to distribute the generated power. Therefore, upgrading would not be necessary in the next years, but in the long run this may be change, even no quantification for this can be given at this moment.[68]

For **biomass** applications getting the grid access can be an issue: cases exist where the regional DSO refused giving access in a late stage of the project, stating the number of grid access applications exceeded the maximum amount. For the smaller companies (bioenergy producers are often decentralised, smaller companies) grid access can definitely a problem. If a company for instance, experienced a couple of cases where the gird access seemed agreed upon by the energy company, but in the final stage of the project the energy company states that there is no capacity for the extra electric power, it can lead a company toward bankruptcy. It principle is possible to make a reservation for transport capacity, using the capacity reservation list[69], but one has to pay for this. [70]

[68] Interviews with various installers/manufacturers of solar modules.
[69] In Dutch: *capaciteit reserveringslijst*.
[70] Interviews with project developers.

Further, companies mention getting transportation capacity on the network proves to be a major problem, in certain places (i.e. Noord-Brabant or Eemshaven[71]) this holds even for smaller biomass based systems of ~1 MW. The financial crises provided some relief in this respect, as many plans for conventional power plants were put on hold and existing plants not always generate at full capacity, leaving room for other (RES) producers. It is unclear whether the new Priority for RES act will improve the situation, as the regulation has not yet passed officially. There is an extensive lobby of the fossil fuel powered plants, which has been very successful in altering the contents of regulations, reducing their effectiveness. Besides, currently there are being built a few huge fossil plants, with plans for more, filling up the capacity of the network even more. Still even when the grid network might become congested, a better management of the grid should be sufficient to, especially when the grid networks in Europe are integrated and in- and exporting capacity can have a balancing effects on RES based input on the network. Also the current total amounts in biomass based input should not be reason for absorbing issues. As for **wind energy** the problems are more serious and again the distinction can be made between the grid access for on-shore and off-shore facilities.

The problem of getting transport capacity for the unpredictable **wind off-shore** power can also be partly solved by constructing interconnectors at sea; these would be able to serve an integrated European market. The current subsidy requirement however does not allow such constructions, and the generated power has to stay in the Netherlands. This has as a consequence that not all grid access can be provided in all cases.

Currently, The TSO does not have an incentive to provide transportation capacity to wind energy. The creation of a European grid network would have great balancing effects on the power distribution and a predictable price of the wind energy. Therefore there is a need for a European wide subsidy system that allows imports and exports of renewable energy (to be eligible for SDE, electricity has to be fed in the Dutch network). Smart grids are another possibility to give a further incentive to the development of wind energy.[72]

Based on the ca. 16 GW of power capacity generation in the Netherlands a TU PhD. has calculated that from a technical point of view, approximately 20 to 30% of renewable electricity is possible to enter the grid, However the financial perspective there remain disadvantages from this for the TSO.

Looking at **on-shore** wind parks, locally, the net access can be a problem. Examples of grid access to be problematic include the North (Friesland) and Kreekrak (Zeeland).

Barrier 8.3 - Problems concerning TSOs and DSOs

Cases exist where the DSO refused giving access, also in late stages of projects, stating the number of grid access application exceeded the maximum amount.

In these cases the grid operators are asked to fortify the net, however in most cases the reaction is rather passive. Official regulations state the grid operators have to give access

[71] Bio-energie in Nederland: monitoring vergunningverlening 2007 (SenterNovem/KEMA).
[72] Interview with supplier of wind turbines.

to the renewable energy. In reality it takes long until offers for grid access are given and the transportation contracts (if given) are not commercially attractive. [70]

Barrier 8.4 – Other Barriers
No barriers detected.

9.2.2 Best Practice Elements and Indicators

Almost all respondents actually prefer to have the German EEG system of mandatory feed-in of renewable energy into the grid. This system has to be recorded in the Dutch law on a lasting and structural basis.

No.	Benchmark	Result
8.1	Are the rules on cost sharing and bearing of grid connection objective, transparent and non-discriminatory?	Yes
8.2	Is the denial of grid connection by TSOs and DSOs a common problem, constituting an important barrier for RES development?	Yes
8.3	Number of months for getting grid connection (considering also approval of grid connection)	N/A
8.4	Estimated connection costs in Euros (in case producer pays)	40.000-250.000

10 Issue 9 Gas Network Issues

10.1 Introduction

The subject of green gas access and connection to the natural gas network is still an issue in the Netherlands. Although a system of green gas certificates is in place, the potential is substantial, specific SDE exploitation subsidies for green gas exist and most (local) grid operators are willing to cooperate, currently there are very few projects including biogas production, upgrading to green gas and gas network injection. Actually, deployment is limited to a few land fill and sewage projects only. In addition, these types of projects inject the gas into local low-pressure (4 to 8 bar) rather than high-pressure networks (high-pressure networks have the advantage that their capacity to absorb the green gas is higher, in particular in low-demand summer time).

Presently, a pioneering relatively large (~3 million m^3 green gas per year) organic waste digester near the city of Zwolle is being constructed for green gas injection in the high-pressure grid. [73]

In the Netherlands, utilities Eneco and Essent as well as a few locally oriented utilities actively market green gas to their end-consumers.

Despite its modest market size, the green gas approach of the Netherlands as compared to other European countries could be considered to be “best practice”.

10.2 Description of barriers & solutions

10.2.1 Detailed description of the barriers and solutions

Barrier 9.1 – No encouragement for upgrading
The biogas has to be upgraded to natural gas quality and compressed for acceptance, but no major barriers other than financial are detected.

Barrier 9.2 - Lack of information
No major barriers are detected.

Barrier 9.3 - Inefficient authorisation procedures
Idem.

[73] http://www.rova.nl/huishoudelijk-afval/compostdag/gft-afval-wat-doen-we-er-mee

Barrier 9.4 – Lack of incentives for infrastructure owners to open to biogas

Although grid operators have no financial or legislative driven incentives to open their networks, it was revealed from the interviews most of them are willing to cooperate.

Possibly, by speculating, this is related to marketing advantages, in particular for relatively small and locally operating energy companies where production, transport and distribution legally are not fully separated yet.

Further, when it comes to the **transportation capacity** of green gas, the current situation looks a bit more positive than for electricity from biomass. Gasunie is currently transporting green gas, when it has a origination certificate and is of natural gas quality. The Dutch state is receiving money from the exploitation, transport and selling of gas as well as the VAT. When green gas is sold, the state still receives cash flows from the transport, selling and VAT on gas. Moreover, if the Dutch natural gas fields are exploited these cash flows will vanish. Therefore, green gas can contribute to a longer lifespan of the natural gas fields. The subsidy SDE finances a part of the exploitation costs of green gas, but part of these costs are reimbursed from the mentioned cash inflows from green gas. Besides, their production results in substantial job creation and positive externalities. This leads to the current situation in which green gas is transported trough the network of GasUnie.[80]

Barrier 9.5 - Other barriers

Currently several projects are being developed connecting various spatially separated biogas producers (farmers, food residue companies, digestion of household waste, sewage facilities, etc.) to a 20-30 km long central biogas ring. The aim is to first collect the biogas, then upgrade and inject it at a single spot thus benefiting from economies of scale with regard to (relatively expensive) equipment for upgrading biogas to natural gas quality. However, these kinds of projects are not eligible for SDE subsidy.

It was revealed by the national energy agency that some green gas projects encounter transport restrictions of the main natural gas network, similar to grid usage limitations in case of electricity.

The construction and maintenance of pipelines dedicated to transporting biogas or green gas is not regulated by law. Some grid operators take initiatives to maintain these pipelines proactively. [74]

10.2.2 Best practice elements and indicators

The system of **green gas** certificates is considered to be “best practice”. For the use of green gas there is a need for a guarantee of origin, proving the renewable nature of the gas and a proof of upgrading towards natural gas quality. This is performed by Vertogas[75], a subsidiary of Gasunie.

[74] Enexis: kwaliteits- en capaciteitsdocument gas 2010-2016.
[75] http://www.vertogas.nl/.

The green certificate system for biogas works on the same principle as that of green power. Amongst others the certificate includes the amount of green gas that is injected and where the gas comes from precisely. The aim is to increase the visibility and marketability of green gas. Now, producers and their customers have to be connected through a pipeline; with such a certificate, this is no longer necessary.

Another Dutch "best practice" is **biomass** cofiring with respect to its scale. The unique **Amer centrale** power plant at Geertruidenberg, yearly cofires around 500,000 tons of wood pellets.

Please fill in here the results of the Benchmark indicators:

No.	Benchmark	Result
9.1	If green certificates and/or subsidies for biogas are in place, do they de facto make unattractive to feed green gas into the grid due to the high level of subsidy for biogas used for electricity generation?	No
9.2	Are the costs of grid connection for producers of gas from renewable energy sources objective, transparent and non-discriminatory?	N/A
9.3	Do transmission and distribution tariffs discriminate against gas from renewable energy sources?	No
9.4	Average time needed for grid connection approval (from application for grid connection to formal approval) in months (#).	N/A

11 Issue 10 District Heating

11.1 Introduction

The Netherlands traditionally possesses quite some district heating, in particular in the major cities (Amsterdam, Rotterdam, Utrecht, etc.). The estimated number of connected residents is 280,000[76]. Most networks are fuelled by heat or residual heat by natural gas based combined heat and power plants or (to some extent – less than 10%) by household waste incineration facilities.

In recent years, however, focus is on constructing smaller networks fuelled by renewables (biomass or organic waste heat or combined heat and power, biogas, etc.). An example is **Project Meerhoven** in Eindhoven. Recently, there have been a few larger scale initiatives to make use of collective solar thermal applications, such as the **solar island** in Almere, dock heating in Haarlem and the Brandaris project in Zaanstad. They were funded by European subsidies, however.

New legislation on district heating is forthcoming. However, this new so-called **Heat Act**[77] targets primarily at protecting consumers as of profit-driven market forces from an economic perspective, rather than stimulating environmental benefits. Historically, the objective of district heating has always been to reduce emissions of fine dust, nitrogen and sulphur oxides etcetera caused by large amounts of decentralized heating systems in densely populated agglomerations.

11.2 Description of barriers & solutions

11.2.1 Detailed description of the Barriers and solutions

Barrier 10.1 – Lack of positive conditions for the increase of the share of renewables in existing DHC systems

Anno 2010 on national level, there are no additional structural stimuli or legislative drivers for green heat distribution. Green heat is exempted from regulatory energy tax (REB), but this is equally valid for heat distribution from fossils. Furthermore, district heating may lower the energy performance standard (EPC) when a new building or neighbourhood is designed and build, but again this is not unique to green heat.

[76] District Heating and Cooling (Euroheat & Power 2009).

[77] In Dutch Warmtewet: http://www.energiekamer.nl/nederlands/warmte/voorbereiding_invoering_warmtewet/index.asp.

However, a subsidy regulation targeted at residual industrial heat[78] usage exists, including a – although for networks relatively modest - cumulative 2010 budget of € 8 million for investment projects. Both district heating and industrial heat networks are eligible; the legal entity applying for the subsidy must be the heat user (i.e. the demand side). Although the regulation is not unique to green heat (from RES), it has an advantage since CO_2 emission reduction (in €/tonne) is one of the main criteria.

Furthermore, some energy distribution companies may use it to boost their image or for marketing purposes. Moreover, at local level some municipalities may mandate newly constructed industrial areas or neighbourhoods to have a low carbon footprint (see **Nij Bosma Zathe** example below). In general, or the heat sector obligations are possible since quite some RES-H techniques are cost effective already.

Finally, some CO_2 emission credits may be derived for greening district heating. This instrument, however, is not part of our study.

Barrier 10.2 –Lack of positive conditions for the initiation and expansion of DH systems largely based on renewables

In case no electricity is produced, there is no generic (exploitation) subsidy for green heat production independent of how the heat is distributed. In case of RES co-generation, a bonus on top of the SDE tariff for green electricity is rewarded under the condition that the heat is used usefully. What is useful is established via listed examples by the officials.

> To illustrate, there is a project where industrial heating could be provided by using waste wood, leading to a reduction in the energy tax and transportation costs on the energy bill of the industrial company, who before used natural gas for their heating needs. Using this construction, high efficiencies for biomass are technically possible. However, in these cases you also compete with other commercial parties, who can use the same biomass product (waste wood) for electricity production but receive SDE subsidy. Subsidy for applying biomass for heating purposes is not possible (if heat is produced only), and this puts a hold on these kind of contracts.[79]
>
> Furthermore, currently, a few large fossil power plants are being built in the Eemshaven region in the Province of Groningen. In their electricity producing process they make about 50% heat, which can technically be used for district heating purposes: only a pipeline must be build. However, currently the heat is not used at all. This also reflects the fact that electricity prices are still high as it is not necessary to commercially exploit residuals of the production process. [80]
>
> Another project is Meerhoven. In this project, a biomass plant supplies 2500 kW sustainable heat to approximately 1,600 homes in the neighbourhoods More Empire and Waterrijk. The feedstock is locally collected pruning. In this way, waste becomes a valuable commodity, which many households benefit. Moreover, there is less CO_2 emitted than with a fossil fuel.

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78 In Dutch: Industriële Warmtebenutting: http://www.senternovem.nl/eos/financiele_steun/Industriele_warmtebenutting/welke_projecten_komen_voor_ibw_in_aanmerking.asp.

79 Interview with biomass project developer.

80 Interview with NGO in the North.

To summarize, most initiatives are still carried out at ad hoc basis, based on local green neighbourhood initiatives etc. The development is very slow and the current legislation does not help the renewable energy applications for district heating as no subsidies are granted if no electricity is co-produced. Many installed CHP systems are small and can only operate a few hours per day; this makes them economically less attractive. [81]

Even though **biogas** is used on limited scale for heating purposes (simply replacing natural gas in combined heat and power), there is more potential for the use of biomass and renewable heat sources to be applied in district heating. An example of biogas usage for heating is **Eco Zathe** in the northern part of the country (Leeuwarden, Province Friesland):

> **Eco Zathe:**
> Biogas is produced by fermentation of manure and other residual flows at farm Nij Bosma Zathe. Biogas supplies via a dedicated gas pipe of 5.5 kilometres a central heating network. This unique demonstration project provides about 1,100 homes in the neighbourhood Leeuwarder Techum (in the north of the country; province of Friesland) of renewable electricity and heat. This project is a result of the fact that the district municipality imposed a CO_2 emission reduction of at least 50%. The municipality supports the application of heat pumps in the neighbourhood as well.

Barrier 10.3 –Other barriers

In the Netherlands, producers of distributed heat are not allowed to charge a higher price to end-consumers than if the heat were produced by natural gas (usually a boiler or a high-efficiency boiler). This so-called **No more than the alternative**[82] principle may hinder the development of green heat networks since (in case of devoid of electricity production) they encompass an uneconomic top that can not be passed on to end-consumers. Again, environmental benefits are not rewarded in frame of the present legislation.

11.2.2 Best Practice Elements and Indicators

For best practice, see the Eco Zathe project as described above.

No.	Benchmark	Result
10.1	Are there policies to promote the increase of the RES share in existing DH networks?	No
10.2	Are there policies to promote the initiation / expansion of DH networks?	No
10.3	Percentage present renewable share (see ECOHEATTOOL)	7%
10.4	Percentage CHP share (idem)	>99%

[81] Interview with supplier of combined heat and power systems.

[82] In Dutch: Niet Meer Dan Anders or NMDA. Another criterion is that the financial returns of projects may not exceed ca. 7%, which also blocks the introduction of sustainable heat.