Bioenergy Status Document

2010 - The Netherlands

>> Focus on energy and climate change
Bioenergy Status Document

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Introduction
The bioenergy status document 2010 shows the current status of bioenergy in the Netherlands, including trends and expectations for the future. The objective of this document is to provide both tiers of government and market parties with an insight into the developments in bioenergy.

Targets and realisation
The government targets for renewable energy are in accordance with the EC Renewable Energy Directive (2009/28/EC). One general target stipulated by the Renewable Energy Directive is that in 2020, 14 percent of the national gross final end use must come from renewable sources.

The action plan for renewable energy submitted by the Netherlands anticipates that 14 percent equals to approximately 300 PJ of renewable energy in 2020. It is estimated that approximately 91 PJ of renewable energy was produced in 2010.

The target stipulated by the Renewable Energy Directive for transport is that in 2020, at least 10 percent of the energy in the transport sector must come from renewable sources. In 2010, an estimated 4 percent of the energy used came from renewable fuels.

In this document, renewable energy, including energy from biomass, is indicated as gross final end use and as such is in line with international statistics and government monitoring.

Conversion of biomass into bioenergy
Approximately three-quarters of the renewable energy produced in 2010 came from biomass. The remainder of renewable energy was produced from sources such as hydropower and wind and solar energy. Renewable energy from biomass is for a large part produced by waste incineration plants, co-firing in energy plants, the use of wood-burning stoves and the use of biofuels in the transport sector.
Bioenergy per conversion technology

Waste incineration plants
At the end of 2009, due to an imminent overcapacity, an agreement was signed between the waste sector and the government. It has been agreed therein not to undertake new initiatives aimed at expanding incineration capacity. The estimated production of renewable electricity has risen to 6.29 PJ of final end use (1,748 GWh) in 2010, with renewal heat production standing at 4.80 PJ.

Co-firing in power plants
In 2010, electricity production by co-firing biomass rose slightly to 11.91 PJ (3,309 GWh). Due to the Environmental Quality of Electricity Production (MEP) scheme being phased out, MEP-subsidised production will be gradually reduced to zero in 2015. Electricity companies indicate that with the discontinuation of the MEP subsidy, co-firing will possibly be discontinued as well, if no additional policies are implemented.

Wood-burning stoves
During the last years, wood-burning stoves in private households are used more and more as a sustainable heat source rather than an atmospheric element. Expectations are that wood consumption in private wood-burning stoves will remain stable in the years to come. The number of newly installed stoves at companies has been decreasing in the last few years.

Digestion
During the past few years, (co-)digestion plants in combination with water treatment / agriculture / organic waste (GFT) or the food processing industry (VGI) have become increasingly popular. In 2010, a shared capacity of approximately 13 MWₑ was taken into service, which includes the co-production of heat. The number of fertiliser fermenters which, in addition to fertiliser, also ferment co-products, showed a particular increase.

Green gas
A recent development is the production of green gas whereby (raw) biogas from fermenting biomass is reprocessed into natural gas quality and fed to the natural gas mains. In 2010, 4 projects were realised with a combined capacity of 16 million Nm³/year. Green gas is (physically or administratively) deployed for the production of electricity, heat or transport fuel.

Thermal conversion
In addition to waste incineration and co-firing in power plants, there are a few other major plants (> 10MWₑ) in operation in the Netherlands which are used for the production of sustainable electricity and/or heat. These plants are fuelled by chicken manure, wood chips, prunings and waste wood or other biomass. In 2010, no new production plants were taken into service.

Transport
After 2007, as a result of the Biofuels (Road Traffic) Decree, the consumption of bioethanol, bio-ETBE and biodiesel increased substantially. In 2010, the compulsory shares of renewable energy in fuel (at least 4 percent of renewable fuels in 2010) ruled the development in the Dutch fuel market.
Overview of bioenergy plants commissioned in 2010

Waste incineration
HVC, Dordrecht  17.8 MW e (biogenous part)
E.ON, Delfzijl  140 tons of steam/hour

Co-firing
Electrabel/GDF SUEZ, Nijmegen  Expansion of plant from 44 MW e to 180 MW e, new capacity: 470 ktons of wood pellets/year

Wood-burning stoves
No overview

Digestion
Kleizen, Langeveen (digestion)  0.06 MW e
Van de Kamp, Mastenbroek (co-digestion)  0.3 MW e
Wadstroom, Holwerd (co-digestion)  0.5 MW e
Rodeco, Putten (co-digestion)  0.7 MW e
Attero, Venlo (digestion)  0.9 MW e
Jorritsma, Trummarum (co-digestion)  1.2 MW e
Ecoson, Son (digestion)  1.3 MW e
Suikerunie, Vierverlaten (digestion)  1.5 MW e
Van Oosten-Schuurmans (co-digestion)  0.8 MW e (expansion from 0.7 MW e to 1.5 MW e)
Eco-energy, Oirschot (co-digestion)  1.1 MW e (expansion from 1.0 MW e to 2.1 MW e)
Orgaworld, Amsterdam (digestion)  4.3 MW e
Total  12.7 MW e

Green gas
Bouwhuis, Witteveen  200 Nm³/hour of green gas
Natuurgas Overijssel (HVC/ROVA), Zwolle  400 Nm³/hour of green gas
Van de Groep, Spakenburg  690 Nm³/hour of green gas
Attero, Groningen  700 Nm³/hour of green gas
Total  1,990 Nm³/hour (equates to approximately 16 million Nm³/year)

Biofuels
Bio Diesel Amsterdam (Greenmills), Amsterdam  110 million litres of biodiesel/year
Abengoa Bioenergia, Rotterdam  480 million litres of bioethanol/year

Petrol stations offering alternative fuels (status up to and including 2010)
Currently the following filling points have been realised (total in the Netherlands):
13 green gas filling points: Amersfoort, Beilen, Delfgauw, Harderwijk, Heemskerk, Hoogblokland, Leek, Leiden, Oss, Purmerend, Steenwijk, Uden and Wespe
31 E85 filling points
0 E30 filling points

Total overview of bioenergy plants
for the electricity, heat and gas sectors: www.b-l-o.nl | for the transport sector: www.agentschapnl.nl/gave
1. Introduction and method

Introduction

The bioenergy status document 2010 gives an overview of the current status, identified trends and expectations for the production of renewable energy from biomass in the Netherlands. The status document has been published since 2003, with market parties and tiers of government as its main target groups.

In 2011, the status document for 2010 was drawn up by the Copernicus Institute on the instruction of Agenschap NL (Sustainable Energy in the Netherlands programme, DEN). The document was prepared in close cooperation with Statistics Netherlands (CBS), CertiQ and other teams within NL Energy and Climate such as the Renewable Energy Production Incentive Scheme (SDE) and Climate Neutral Gaseous and Liquid Energy Carriers (GAVE).

Monitoring renewable energy: gross final end use

Contrary to previous publications of the status documents, the contribution of renewable energy is no longer presented in fossil energy use prevented, but in gross final end use. This is described in the Monitoring Renewable Energy Protocol [Agentschap NL 2010]. This method is in line with the Renewable Energy Directive.

Gross final end use is energy supplied to the end users of energy (industry, households, transport and agriculture). The energy content of gross electricity (standardised for wind power and hydropower), heat and biofuels to end users comes under gross final end use.

The supply of green gas is shown under renewable heat. For the combustion of wood in wood-burning stoves, the energy content for wood is included as gross final end use [Agentschap NL 2010].

1 For previous editions, go to http://www.senternovem.nl/duurzameenergie/publicaties/publicaties_bio-energie/statusdocument_bio-energie.asp.
2 Copernicus Institute, Natural Science and Society Group, Bèta Faculty, Utrecht University, Utrecht
2. Quantitative contribution

Renewable energy in the Netherlands
The Netherlands has a varied mix of renewable energy sources (see figure 1). Energy from biomass and wind energy make a substantial contribution to the total volume of renewable energy. Thanks to government incentive programmes, the use of renewable energy in the past decade has risen. The figure below shows the gross final end use of renewable energy in the Netherlands. The details for 2010 are based on provisional data and estimates.

Figure 1 clearly shows a rising trend for all renewable sources, up to 91 PJ in 2010. In order to achieve the general national target of 14 percent renewable energy, the national action plan for renewable energy expects that approximately 300 PJ is needed in 2020.

Biomass for three sectors
Energy from biomass is used in the electricity, heat and transport sectors. The consumption within these three sectors is shown in table 1. The electricity production is based on provisional data from Statistics Netherlands (CBS). The heat generation is estimated on the basis of identified trends. The consumption of biofuels has been calculated on the basis of the rising share of renewable energy in transport and the deployment of biofuels in 2009.

The total and the separate categories show a light to strong rise in the period 2005-2010. Co-firing forms the exception due to a dip in 2006 and 2007. The development of renewable energy can be attributed to government policy, e.g. the effects of the (public transport) Environmental Quality of Electricity Production (MEP) and Renewable Energy Production Incentive (SDE) subsidy schemes, as well as the obligation for biofuels.

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Figure 1 Renewable energy in the Netherlands 2000-2010.

1 Data for 2010 on the basis of provisional data and estimates
**Electricity sector**

Renewable energy from biomass is generated in waste incineration plants, co-firing in power plants, other combustion and conversion of biogas from digestion plants.

The increase in the waste incineration plants (AVIs) category can be attributed to the volume of waste that is incinerated, the increase in the average efficiency of AVIs and the increase in the biogenous share (biomass) in the waste.

Since 2000, the use of biomass in power plants, particularly coal-fired power plants, has strongly increased, driven mainly by government incentive programmes. Partly due to adjustments in MEP subsidy and the sustainability discussion, electricity production through co-firing fell considerably between 2006 and 2007. This particularly affected the use of liquid biomass such as palm oil. In 2010, thanks to the gradual increase in co-firing of imported wood pellets in coal-fired power plants, 2005 levels were reached once again.

The ‘other combustion’ category mainly involves the incineration of waste wood and chicken manure. In 2010, around 6.8 PJ of bioenergy was produced in this category.

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**Table 1** Use of Bioenergy in gross final end use (PJ) in the electricity, heat and transport sectors in the period 2005-2010 [Statistics Netherlands (CBS)2010-a].

<table>
<thead>
<tr>
<th>Category</th>
<th>Sector</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010/4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste incineration plants</td>
<td>Electricity</td>
<td>4.56</td>
<td>4.72</td>
<td>5.02</td>
<td>5.07</td>
<td>5.72</td>
<td>6.29</td>
</tr>
<tr>
<td></td>
<td>Heat</td>
<td>3.52</td>
<td>3.87</td>
<td>3.84</td>
<td>4.07</td>
<td>5.01</td>
<td>4.80</td>
</tr>
<tr>
<td>Co-firing</td>
<td>Electricity</td>
<td>12.42</td>
<td>11.68</td>
<td>6.54</td>
<td>8.09</td>
<td>11.17</td>
<td>11.91</td>
</tr>
<tr>
<td></td>
<td>Heat</td>
<td>0.69</td>
<td>0.55</td>
<td>0.82</td>
<td>0.79</td>
<td>0.91</td>
<td>1.14</td>
</tr>
<tr>
<td>Wood burning stoves-households</td>
<td>Heat</td>
<td>11.10</td>
<td>11.56</td>
<td>12.06</td>
<td>12.17</td>
<td>12.29</td>
<td>12.32</td>
</tr>
<tr>
<td>Wood burning stoves-industry</td>
<td>Heat</td>
<td>2.07</td>
<td>2.31</td>
<td>2.55</td>
<td>2.69</td>
<td>2.79</td>
<td>2.88</td>
</tr>
<tr>
<td>Other combustion</td>
<td>Electricity</td>
<td>0.85</td>
<td>0.85</td>
<td>0.91</td>
<td>2.39</td>
<td>3.23</td>
<td>3.48</td>
</tr>
<tr>
<td></td>
<td>Heat</td>
<td>2.25</td>
<td>3.08</td>
<td>3.26</td>
<td>3.34</td>
<td>3.23</td>
<td>3.30</td>
</tr>
<tr>
<td>Biogas</td>
<td>Electricity</td>
<td>1.03</td>
<td>1.26</td>
<td>1.80</td>
<td>2.59</td>
<td>3.18</td>
<td>3.26</td>
</tr>
<tr>
<td></td>
<td>Heat</td>
<td>0.31</td>
<td>0.24</td>
<td>0.38</td>
<td>0.49</td>
<td>0.56</td>
<td>0.68</td>
</tr>
<tr>
<td></td>
<td>Raw biogas</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biopetrol</td>
<td>Transport</td>
<td>0.79</td>
<td>3.69</td>
<td>4.52</td>
<td>5.77</td>
<td>6.73</td>
<td></td>
</tr>
<tr>
<td>Biodiesel</td>
<td>Transport</td>
<td>0.10</td>
<td>0.97</td>
<td>9.34</td>
<td>7.52</td>
<td>9.84</td>
<td>9.91</td>
</tr>
<tr>
<td><strong>Total (PJ)</strong></td>
<td></td>
<td><strong>40.25</strong></td>
<td><strong>43.21</strong></td>
<td><strong>51.31</strong></td>
<td><strong>54.74</strong></td>
<td><strong>64.81</strong></td>
<td><strong>68.06</strong></td>
</tr>
</tbody>
</table>

During the past years, a large number of (co-)digestion plants have been taken into service, which convert biogas into electricity. Within this category, part of the gross energy production (approximately 10 percent) is used for the plant itself. The gross final end use as indicated in table 1 and figure 2 is higher than the net supply and contributes to the realisation as defined in the Renewable Energy Directive. The expectation for renewable energy in 2020 has been laid down in the national action plan for renewable energy. The expectation for electricity from solid biomass in 2020 is 43 PJ and for electricity from biogas 17 PJ, in addition to e.g. wind on land (48 PJ) and offshore (69 PJ), [EZ 2010].

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**Figure 2** Gross final electricity production with bioenergy in 2010 (PJ).

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4 NOTE: the error margin in the data for wood-burning stoves is an estimated 50 percent, which is significantly higher than the error margin in all other data reported in this table.

5 Efficient final use outside fermenters, e.g. for the production of green gas; and direct combustion of raw biogas in the food, tobacco and industry (VGI) sector.
Heat sector

Heat production from renewable sources mainly comes from small-scale combustion and the production of residual heat during electricity generation. The main aim of waste incineration plants, power plants and other incinerators is the production of electricity, yet they do also produce residual heat. In addition to these plants, wood-burning stoves in companies and households are important heat sources.

Figure 3 demonstrates that in 2010, heat from wood-burning stoves is the largest source of renewable energy. It needs to be noted here that this is a rough estimate with an error margin of 50 percent. During the last years, the production of heat from wood-burning stoves has increased only slightly. On the other hand, heat from biogas and large-scale combustion of solid biomass has been showing a strong increase in the past years. The production of green gas in digestion plants, in accordance with the gross final end use method, is currently presented within the heat sector.

In accordance with the renewable energy action plan, it is expected that heat in 2020 will mainly be generated through combustion of solid biomass (27 PJ), direct combustion of biogas (12 PJ) and green gas fed into the natural gas mains (24 PJ) [EZ 2010].

Transport sector

The use of biofuels in 2006 was marginal. In the run-up to the implementation of the Biofuels (Road Traffic) Decree in January 2007, the production of biofuels prior to 2007 was promoted through tax advantages. As from 2007, the market for biofuels has been grown rapidly thanks to the obligation to purchase a certain percentage of sales from renewable sources. This percentage has been going up since 2007.

The Renewable Energy Directive stipulates that article 21, paragraph 2 biofuels can be counted double for their contribution to the transport target (10 percent). These fuels include biofuels produced from waste, residuals, non-food cellulose material and lignocellulosic material.

Figure 4 shows the various biofuels used in 2009 in order to meet the renewable sources share. This concerns the administrative supply as declared by the companies. It needs to be noted that companies can report administrative figures other than the physical supply. They can do this to e.g. carry over a surplus of consumption to next year. This can create a difference between the physical supply (Statistics Netherlands (CBS) data) and the administrative data (biofuels report to the EU).
3. **Policy framework developments**

**Directives and renewable energy**

The target for renewable energy in Europe has been laid down in Directive 2009/28/EC of the European Parliament and the Council of the European Union [EU 2009]. This Directive is internationally known as the Renewable Energy Directive (RED). The binding target figure for Europe is a minimum share of 20 percent of renewable energy in the gross final end use.

In respect of the Netherlands, this European target translated into at least 14 percent of renewable energy in 2020. The manner in which this realisation must develop in the period 2010-2020 has been laid down per country in the so-called ‘indicative path’. For the Netherlands this means that an average of 4.7 percent of energy consumption in 2011-2012 must be generated through renewable sources.

In addition, a target for the transport sector; in 2020, each EU member must realise at least 10 percent of renewable energy in the transport sector [EU 2009].

The Renewable Energy Directive further stipulates that all member states must draw up an action plan for energy from renewable sources. The Netherlands have submitted the action plan to the European Committee in time (before July 2010). This Dutch action plan [EZ 2010] for energy from renewable sources describes the manner in which the Netherlands intend to realise the targets.

In addition to the RED, fuel suppliers are obliged by the FQD (Fuel Quality Directive, 2009/30/EC) to reduce CO₂ emissions by at least 6 percent in the period 2011-2020. This requirement applies to the entire production chain; ‘from well to wheel’.

Figure 5 shows the volume of energy realised until 2010, the 2020 target and the indicative trajectory.

![Figure 5](image-url) **Figure 5** Share of renewable energy in gross final end use.
Support for bioenergy in the Netherlands
In respect of bioenergy, we distinguish financial incentives and supplementary policies. In 2010, the People’s Party for Freedom and Democracy (VVD) and the Christian Democratic Alliance (CDA) entered into the coalition agreement ‘Freedom and responsibility’ with agreements on the renewable energy policy.

Financial incentives
In order to support the development of renewable energy in the Netherlands, various financial measures are in place:

• Until August 2006, it was possible to apply for the Environmental Quality of Electricity Production (MEP) subsidy for electricity produced by conversion of biomass, wind energy, hydro energy and solar energy and Combined Heat and Power (CHP) plants. Approved applications are paid out until the end of the subsidy term, up to 10 years after the start of the subsidy.

• The OVMEP was a transition scheme between the Environmental Quality of Electricity Production (MEP) and the Renewable Energy Production Incentive (SDE) schemes, with the specific aim of facilitating the development of digestion plants. Companies who had applied for the environmental and building permits for digestion plants smaller than 2 Mwe before August 2006, could apply for subsidy.

• The Renewable Energy Production Incentive Scheme (SDE) is the successor of the MEP and OVMEP. Since 2008, the SDE reimburses the unprofitable top of sustainable energy per energy unit (kWh). Subsidy could be applied for in 2010 for the specific use of biomass for waste incineration, biogas production at wastewater treatment plants (AWZIs) and sewerage water treatment plants (RWZIs), thermal conversion and digestion of solid and liquid biomass. In 2010, the budget was 651 million Euros for electricity from biomass and 214 million Euros for gas from biomass.

• Investments in environmentally-friendly operating assets are promoted by tax schemes such as the Environmental Investment Tax Scheme for Businesses (MIA) and Random Depreciation of Environmental Investments (VAMIL). The VAMIL scheme offers entrepreneurs the possibility to depreciate investments according to personal insight. Under the MIA scheme, 15, 30 or 40 percent of investments can be deducted from the taxable profit, offering additional tax relief.

• The Energy Investment Allowance (EIA) scheme stimulates investments in renewable energy, as 44 percent of the investment expenses can be deducted from the taxable profit. In 2010, the total budget for the EIA was set at 150 million Euros.
Additional policy

- In 2010, various laws and regulations came into effect, potentially facilitating the use of biomass for energy production and the realisation of bioenergy projects. With the Environmental Permitting (General Provisions) Act (Wabo), the Crisis and Recovery Act and the National Coordination (Energy Infrastructure Projects) Regulations coming into effect can give an effect in the acceleration of the granting of permits for bioenergy projects.

- In 2010 work has been carried out in order to implement the agreements from the ‘Clean and Efficient’ work programme. The ambition in the “Clean and Efficient Agricultural Sectors” agreement is to generate approximately 200 PJ of renewable energy from biomass in 2020.

VVD-CDA coalition agreement ‘Freedom and responsibility’

With regard to renewable energy, the following has been included in the coalition agreement of the Rutte-Verhagen government:

- The European targets for renewable energy provision are leading.
- The Energy Production Incentive Scheme (SDE) will be transformed into an SDE+.
- The government aims to set up a Green Deal with society.
- More intensive research into and application of energy sources.

The SDE+ will come into effect in 2011. One change that has been announced is the new method of financing and the phased registration, whereby projects with low subsidy requirements can register first. As from 2012, projects solely producing heat will also be included in the SDE+.

In 2010, the top sectors approach was presented. The objective of the top sector energy is to strengthen the energy sector, create jobs and promote innovation. The top sectors approach will discuss an integral approach of a) research and development, b) demonstration and exploitation, c) infrastructure and regulation and d) sectoral preconditions.

The objective of the ‘Green deal’ that has been announced is to accelerate the introduction and application of new technologies. The green deal will be supplementary to the existing instruments and agreements.
Sustainability

Implementation of the Renewable Energy Directive
In 2010, the implementation of the Renewable Energy Directive (RED) and Fuel Quality Directive (FQD) were focal points in respect of the sustainability of liquid biofuels. The main objective of the Dutch government here is being sustainable in achieving the obligatory volumes in accordance with the requirements as stipulated in the European Renewable Energy Directive [Atsma 2010].

Before July 2011, companies must indicate which certification scheme, accepted by the European Committee or Dutch Emissions authority (NEa), they will use for achieving the sustainability of the biomass used by them. As from 1 July 2011, the government requires this claim to be corroborated by a verification institute. As from 1 January 2012, the verifying body must declare that the relevant standard has been met in terms of substance. In addition, the verification agency must demonstrate that they, as from 1 July 2011, are authorised for the relevant system and/or have demonstrably started the authorisation process.

In 2010, the second NEa report concluded that the sustainability of biofuels consumed has indeed been demonstrated one way or another, yet only a small part has been independently verified against the RED criteria [NEa 2010].

A calculation tool for biofuel greenhouse gas emissions has been developed within BioGrace [BioGrace 2011]. In the spring of 2011, this tool will be submitted to the European Committee to obtain recognition as a voluntary scheme under the Renewable Energy Directive.

The Dutch government wishes to work on further harmonisation within the EU in order to promote a level playing field, including the European-wide acceptance of certification schemes which can be used to demonstrate the sustainability of biofuels.

In 2010, the European Committee said that there will be no sustainability certification in respect of solid biomass as yet.

The European Committee announced that it will make a decision on this at the end of 2011 [COM 2010]. In the event that national governments wish to implement binding criteria in the meantime, the EC recommends implementing criteria analogous to those for liquid transport fuels.

In 2009, the Sustainability Issues Biomass Committee was installed (Corbey Committee). The Corbey Committee argues for imposing obligatory European sustainability criteria for solid biomass [Corbey 2011].

In 2010, companies used voluntary sustainability certification. RWE Essent reports that more than 70 percent of the biomass consumed by them in 2009 was certified with the GreenGoldLabel and around 85 percent in 2010 [Schouwenberg 2011]. The market share of RWE Essent in co-firing is more than 80 percent.

Development of national and European standards
In the Netherlands, work is carried out on a certification scheme for sustainable energy applications, NTA 80806, which consists of three parts:

- NTA 8081, “Certification scheme for sustainably produced biomass for energy purposes”, accepted by the Dutch Accreditation Council in December 2010.
- Interpretation document with NTA 8080, most recent version is number 3, January 2011.

The certification scheme has been operational since mid-December 2010. The certification scheme has also been submitted to the European Committee to obtain recognition as a voluntary scheme under the Renewable Energy Directive.

CEN, the European standards committee, is working on a standard “Sustainably produced biomass for energy applications”, which consists of four parts. The first three parts will be subjected to a public comments round in the period December 2010 to April 2011. It is expected that the fourth part will be subject to a public comments round from March 2011 to July 2011. The CEN planning is that in the first half of 2012 the standards are implemented nationally and brought in line with other standards.

For further information, go to www.nta8080.org

6 For further information, go to www.nta8080.org
4. Bioenergy per conversion technology

Waste incineration plants

Policy framework
In December 2008, the new Waste Framework Directive (2008/98/EC) came into force. The energy production of waste incineration plants (AVIs) has been brought under the definition of ‘efficient application’, provided that their energy efficiency is at least 0.60 (0.65 for new AVIs). This status, the so-called R1 status, must provide additional support to high-efficiency waste incineration at a European level in order to further reduce the depositing of combustible waste.

By the end of 2009, due to the imminent overcapacity at AVIs in the Netherlands, an agreement was entered into between the sector and the central government. It has been agreed therein that the sector will not undertake new initiatives aimed at expanding capacity and that the central government will ensure that the AVIs qualify for R1 status sooner. In March 2010, R1 status was granted to a number of AVIs with a combined incineration capacity of 4.3 Mtons per year. The total national incineration capacity is 7 Mtons of waste per year.

Tiers of government promote a higher energy efficiency by AVIs, e.g. by means of the IPPC Directive (BREF Waste Incineration) and the Renewable Energy Production Incentive Scheme (SDE). In 2008, the SDE was made available to AVIs with energy (Senter) efficiency of more than 22 percent, with an increasing subsidy amount in line with further rising (Senter) efficiency (towards 31 percent and up). A number of AVIs have meanwhile made use of this SDE.

Trends and developments in projects
The amount of waste incinerated and the energy generated as result have been rising slightly for the past years. As a result of a change in the biogenous share in waste, the renewable electricity and heat production has risen. In 2008, 49 percent of the total energy production of AVIs was deemed renewable. In 2009, based on the most recent version of the monitoring protocol, the share of renewable material in waste was 51 percent. Expectations are that the biomass share in waste will increase, thanks to a better source separation of plastic packaging, among other things.

The permit for expansion of the Essent Milieu Wijster AVI was previously rejected on the grounds of too low a return (IPPC Directive). This delay ultimately led to cancellation and the conclusion of the ‘Wijster Agreement’. This agreement between Essent, the Drenthe provincial authorities and the Drenthe Environmental Federation binds the parties in their joint obligation to convert Wijster business park into a green energy transition park. For example, in the spring of 2010, Essent started the post-separation of plastics, and the arrival of a digestion plant for organic waste (GFT) is on the agenda.

In September 2007, the revision permit for AVR (Rijnmond Industrial Waste Processing Company) in Rotterdam was voided due to too low a return. Subsequent consultation between AVR and the environmental movement has led to an agreement in principle on measures to improve return, particularly through additional heat supply. This required an investment of 250 million Euros. According to AVR, this was no longer feasible with a view to the changed market conditions. The plant was decommissioned as from 1 January 2010.

In 2009, the third incineration line (216 ktons) of Twence was taken into service. The design of the new Twence plant is such that, in addition to electricity, it will also supply heat to companies and homes.

The AVIs of E.ON in Delfzijl and HVC in Dordrecht were taken into service in 2010. The E.ON plant at Oosterhorn industrial park is a waste incineration plant for conditioned industrial and domestic waste. Since May 2010, the companies located there can opt to receive thermal energy, which is supplied as steam via a distribution network measuring 3 km in length.

---

7 ‘Senter efficiency’ = electric efficiency + 2/3 thermal efficiency.
The above table offers an overview of waste volumes used for the generation of electricity and heat. The presented data relates to 2009. In that same year, the weighted average net (Senter) efficiency (electrical + 2/3 heat) amounted to approximately 25 percent.

A specific waste stream is sludge, which is produced at e.g. wastewater treatment plants (RWZIs). In the Netherlands, this wet sludge is used in e.g. the cement industry and in energy plants after drying or composting. A total of 19 ktons of dried sludge was used in Dutch energy plants, as opposed to 60 ktons in energy plants abroad.

The cement industry used approximately 66 ktons of dried or composted sludge. In addition to wastewater and paper sludge, the cement industry also used animal flour and PPDF pellets. PPDF pellets are made of plastic and paper and partial biogenous material. The total estimated use of biomass in the cement industry is approximately 1.5 PJ, roughly divided across PPDF pellets (1/6), animal flour (1/6) and wastewater sludge (2/3).

### Status of recent permit applications

In 2010, Sita Roosendaal was in the start-up phase. The plant is to be taken into full service in 2011. It will process 291 ktons of waste and, in addition to heat for greenhouses, it will also supply 0.99 PJ of electricity per year. In 2010, Omrin waste company started the construction of the Residues energy plant (Rec) in Harlingen.

The design is based on a capacity of approximately 230,000 tons of waste per year. In 2010, the construction of this initiative was the subject of legal proceedings.

---

<table>
<thead>
<tr>
<th>Plant</th>
<th>Total waste used</th>
<th>renewable electricity</th>
<th>renewable heat</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>tons</td>
<td>PJ</td>
<td>PJ</td>
</tr>
<tr>
<td>Attero Noord BV GAVI Wijster</td>
<td>609,016</td>
<td>0.66</td>
<td>0</td>
</tr>
<tr>
<td>Twence Afval en energie</td>
<td>493,150</td>
<td>0.51</td>
<td>0</td>
</tr>
<tr>
<td>ARN B.V.</td>
<td>267,620</td>
<td>0.36</td>
<td>0.35</td>
</tr>
<tr>
<td>AVR Afvalverwerking BV</td>
<td>360,635</td>
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<td>0.30</td>
</tr>
<tr>
<td>Afval Energie Bedrijf</td>
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<td>0.02</td>
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<td>1.63</td>
<td>0.13</td>
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<td>ZAVIN CV</td>
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<td>0</td>
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<tr>
<td>AZN</td>
<td>858,570</td>
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<td>3.38</td>
</tr>
<tr>
<td>SITA ReEnergy</td>
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<td>0.05</td>
</tr>
<tr>
<td>Total</td>
<td>6,333,003</td>
<td>5.73</td>
<td>5.19</td>
</tr>
</tbody>
</table>

Table 2: State of affairs of waste incineration plants 2009 (Source: Agentschap NL / WAR, 2010).
Co-firing in power plants

Policy framework
Since 2006, it is no longer possible to apply for co-firing subsidy under the Environmental Quality of Electricity Production (MEP) scheme. Granted subsidies will be paid out until the end of the agreed project term. The electricity production subsidised by the MEP scheme will be reduced in steps and be fully phased out in 2015. Co-firing falls outside the Energy Production Incentive schemes, SDE and SDE+. The Minister of Economic Affairs, Agriculture and Innovation believes that large-scale co-firing in power plants is a cost-effective method to realise the 2020 renewable energy target [Verhagen 2010]. The Minister is studying whether co-firing in coal-fired power plants can be promoted in another way.

Trends and developments
The electricity production in plants by means of co-firing bioenergy in coal or gas-fired energy plants is shown in table 1 (page 9). Figure 6 shows the use of biomass for co-firing in energy plants. After 2006, the share of liquid mass fell rapidly, which trend was driven mainly by the discussion on the sustainability of palm oil, resulting in a strong reduction in the production of renewable energy in 2007. In 2010, it was estimated that, compared to 2009 levels, the use of biomass for renewable electricity generation had slightly risen to 11.6 PJ (3,234 GWh), using solely solid biomass. This has brought production levels back to those of 2006. Solid biomass mainly uses wood pellets. Other forms of solid biomass include wood chips, waste wood and non-specified sources (non-wood materials from primary farming or agriculture industries).

In 2010, it was the first time that RWE Essent co-fired more than 50 percent of biomass in the Amer-9-plant. Essent accounts for more than 80 percent of the total co-firing volume in the Netherlands. The test demonstrated that co-firing 50 percent of biomass is technically feasible, for short periods of time.

Recent permit applications and expectations
In April 2010, the co-firing capacity of biomass in the Gelderland plant, plant 13 of Electrabel (GDF Suez) was increased from 44 MW_e to 180 MW_e. As a result, the plant is expected to co-fire 470,000 tons of wood pellets per year. The conversion involved an investment of more than 40 million Euros.

Figure 6 Use of biomass for co-firing in power plants in the Netherlands (primary energy content).
Wood-burning stoves in households

Policy framework
Since the discontinuation of the mandatory NL type examination for atmospheric heaters in 2004, stoves are currently only subject to the relatively relaxed CE requirements [Koppejan 2010]. As a result of these safety requirements, stoves are sold with state-of-the-art performances.

Trends and developments
Three main types of wood-burning stoves are distinguished in households: open fireplaces, recessed fireplaces and freestanding stoves. The average thermal efficiency for open fireplaces in the Netherlands is 10 percent and remained unchanged. In the period 1990-2009, the efficiency of recessed fireplaces rose from 47 to 54 percent. In that same period, the thermal efficiency of freestanding stoves rose from 53 to 71 percent.

The number of open fireplaces and recessed fireplaces in the past decade fell, whereas the number of freestanding stoves increased. This can be explained by the fact that in the last 5-10 years, stoves are more and more chosen for their (renewable) energy yield, rather than for atmospheric heating purposes. It is safe to assume that the largest part of fireplace wood comes from Dutch trees, with the majority thereof received from, collected at or sold by private individuals [CBS 2010-c]. Partly because of this, there is a significant error margin in respect of the volume of wood used. Statistics Netherlands estimates that the error margin in the production of this renewable heat source is 50 percent.

Recent permit applications and expectations
Expectations are that stricter product requirements for wood-burning stoves will become effective under the European Ecodesign Directive (2009/125/EC) in 2012. It is further expected that a labelling system will be implemented, with poorly performing stoves being phased out.
Wood-burning stoves in companies

Policy framework
Apart from the Energy Investment Allowance (EIA) scheme, the Netherlands do not have a financial policy that supports biomass-fired heat generation. On 1 April 2010, the Emissions Limit (medium-sized Combustion Plants) Decree came into effect. The BEMS stipulates limits for NOx-, SO2 and particulates emissions. Heat generation of more than 1 MWt is subject to the BEMS framework. Heat generation of less than 1 MWt is subject to the requirements of the Dutch Emissions Guideline (NER) for air, section F7.

Trends and developments
In the last years, the installed capacity of wood-burning stoves has risen. The figure has been driven up mainly by systems of less than 0.5 MWt, which have strongly increased in the past 5 years. The efficiency of wood-burning stoves at companies has also increased.

The agriculture sector in particular has seen an increase in the number of wood-burning stoves being installed. Wood-burning stoves can be particularly interesting in the event of a continuous demand for heat and a high level of full load hours, such as in calf fattening farms, swimming pools and poultry farms.

Recent permit applications and expectations
Making a detailed forecast on the development in wood-burning stoves is difficult. Expectations are that the use of heat will be increasingly promoted by the European member states. This is because heat is given a relatively higher priority within the monitoring system of the Renewable Energy Directive. Further promotion of heat has been announced within the Renewable Energy Production Incentive Scheme plus (SDE+) for the opening of 2012.

Digestion plants

Landfill gas / wastewater treatment plants
Generating electricity using landfill gas did not grow in the last years or even fell. Since less waste is deposited, the extraction of landfill gas is falling. Biogas produced as part of sludge digestion in water treatment plants is used more and more for the production of electricity, heat or green gas. Generating green gas in water treatment plants has become an interesting option, partly thanks to the Renewable Energy Production Incentive Scheme (SDE). In 2010, biogas generation plants near sewerage water treatment plants (RWZIs) in Beverwijk and Mijdrecht in the Netherlands produced green gas.

Co-digestion/organic waste (GFT) digestion/digestion
Digestion plants in combination with agricultural companies, organic waste (GFT) digestion and digestion of other streams are becoming increasingly popular. The realisation of digestion plants near agricultural companies in particular grew significantly in the past few years.

In June 2010, parties in the Dutch composting sector signed a sustainability statement. This statement expresses the intention to ferment 1,000 ktons of organic waste in 2015. Currently, around 80 ktons are fermented. In 2010, the combined capacity of the five new projects within (other) digestion plants, including digestion of organic waste (GFT) and in the food processing industry (VGI), is 8.1 MWt.

VGI digestion are digestion projects directly related to the food processing industry. In addition to other digestion, various streams from the VGI are also used in co-digestion.

In 2010, records indicate that 6 new plants have been taken into service for co-digestion (minimum of 50 percent of manure), with a combined capacity of 4.6 MWt (see page 6 for the overview of plants taken into service). The trend for co-digestion is an increase in scale to plants of approximately 1.5 MWt. In addition, there is a growing interest for small-scale digestion systems for the production of energy for personal use, without the use (or with limited use) of co-products. An example thereof is the Microferm digestion system developed by Host of Enschede, the Netherlands.
Green gas
The production of green gas (natural gas quality) has seen a strong development in the past period, partly as a result of the inclusion of green gas in the Energy Production Incentive Scheme (SDE). Green gas produced from raw biogas is fed into the existing natural gas mains and transported to the end users. This enables use by farming or agricultural industries.

In 2010, the annual production capacity of all green gas production locations grew from approximately 16 million Nm³ to a total of 37 million Nm³. In addition to the central government, provincial and local authorities and joint ventures promote the development of green gas production locations.

Trends and developments
If green gas is fed into the existing natural gas mains, it replaces the use of natural gas. In that case, the gas to be fed in must have the same properties as the natural gas in the natural gas mains. The quality requirements that are going to be attached to green gas are expected to be presented by the joint gas network managers early 2011. In addition, they can be submitted to the Office of Energy Regulation. The Office of Energy Regulation can record these requirements and with that supplement the current “connection and transport conditions”.

When feeding green gas into the gas network, the costs for upgrading biogas to natural gas quality play an important role. As a result, the required scale of projects appears to significantly increase in first instance. The production capacity of individual projects must not exceed the local feed-in capacity in the regional gas network. This can be secured by biogas hubs and other applications.

Biogas hubs and energy innovation agenda
Interlinking biogas pipelines via a so-called biogas hub is one possibility. Subsequently, the collected biogas is upgraded to natural gas quality at a central location and fed into the (national) gas transport network.

In addition, small-scale digestion projects are combined with (bio) gas networks to which the biogas end users are connected.

Furthermore, work is carried out on applications of biogas production that can operate on a commercial basis in the future. The “Effective and efficient digestion” tender which was issued in 2010 on the basis of the innovation agenda is expected to further boost these developments.

Research into network incorporation
In 2010, regional studies were conducted into the possibilities for network incorporation. This concerned research into gas marketing opportunities for projects in developments. The marketing opportunity is not directly determined by the capacity of the present gas pipelines, but more by the sales of gas in that same area. Gas can only be injected into a gas network if this capacity is indeed in demand at that moment and in the same pressure phase. These studies demonstrate that gas sales during the summer period are limiting for the feed-in capacity of green gas in the regional gas network.

In order to increase the feed-in capacity, adjustments must be made to the gas network. This includes the creation of so-called overflows. Gas that can no longer be fed into the regional gas network is compressed and fed into the GTS national gas transport network (Gasunie Gas Transport Services).
Small-scale combustion
In 2010, records indicated that there were no new projects for small-scale combustion for electricity generation. The deployment of liquid biomass in the transport sector is probably the reason why no new plants for the combustion of liquid biomass were realised.

10-50 MWₑ bioenergy plants
In addition to the major plants used for waste incineration and electricity production by power companies, few other major bioenergy plants are in operation. Since 2004, paper producer Norske Skog Parence has been using a 45MWₑ bio-boiler with an input of 140,000 tons of internal biofuel. In addition, Twence has a 23 MWₑ system in use. In Moerdijk, there is a system for processing chicken manure. Electricity (36.5 MWₑ) is generated via a steam cycle. In May 2010, the Cuijk plant of Essent (capacity of 25 MWₑ) was temporarily taken out of service, as payments to the company under the Environmental Quality of Electricity Production (MEP) scheme were stopped as from the autumn of 2009 [Schouwenberg 2011].
### Table 3 Minimum energy shares of renewable sources for petrol and biodiesel per year [GAVE 2011].

<table>
<thead>
<tr>
<th>Year</th>
<th>Minimum energy share of biopetrol in petrol [%]</th>
<th>Minimum energy share of biodiesel in diesel [%]</th>
<th>Minimum energy share of renewable sources in transport fuels [%]</th>
</tr>
</thead>
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<tr>
<td>2007</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
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<tr>
<td>2008</td>
<td>2.50</td>
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<tr>
<td>2010</td>
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<td>4.00</td>
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<td>2011</td>
<td>3.50</td>
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<td>4.25</td>
</tr>
<tr>
<td>2012</td>
<td>3.50</td>
<td>3.50</td>
<td>4.50</td>
</tr>
<tr>
<td>2013</td>
<td>3.50</td>
<td>3.50</td>
<td>5.00</td>
</tr>
<tr>
<td>2014</td>
<td>3.50</td>
<td>3.50</td>
<td>5.50</td>
</tr>
</tbody>
</table>

### Biofuels in transport

#### Policy framework

In 2006, in order to promote the use of biofuels, admixing biofuels was met by a reduction in excise. As from 2007, this reduction in excise no longer applies and oil companies are obliged to realise part of their sales in the form of biofuels. This concerns an obligatory market share, meaning that this percentage must be achieved as an average value during a calendar year. Therefore, not every litre of petrol or diesel needs to contain biofuels. A minimum share of renewable sources has been implemented for both biopetrol and biodiesel in order to develop both markets. Companies are (to an extent) free in their choice of biofuels in order to achieve the minimum share required.

Methanol, ethanol and bio-ETBE can be used as biopetrol admixtures. Bio-ETBE is a fuel admixture on the basis of a fossil component and biogenous component; reprocessed bioethanol. The biogenous share in bio-ETBE is, in terms of energy, 37 percent (guideline for renewable energy). Fossil diesel can be replaced by e.g. biodiesel, pure vegetable oil and hydrogenated vegetable oil. Biofuels made of waste, residuals non-food cellulose material and lignocellulosic material can be counted double in the realisation of the transport objective of the Renewable Energy Directive (RED). In the Netherlands, this double counting has been implemented in the better biofuels double counting Regulation of December 2009. As such, particularly used frying oil and animal waste fats are counted double in the Netherlands since January 2009 (with retrospective effect). Electricity use in transport, with a renewable energy share in the European electricity network of 17.4 percent in 2011 (based on 2009 data), can also be counted as renewable source and be counted 2.5 times for the transport target in road transport.

In addition, biogas delivered directly or indirectly via the natural gas mains can be counted. In order to promote the sales of biofuels, the Petrol Stations Alternative Fuels subsidy programme offers subsidy to petrol station operators for natural/green gas, E85 (bioethanol) and/or B30 (biodiesel) filling points.

#### Trends and developments

In the past years, the minimum admixture obligation was achieved. Fuel suppliers clearly take advantage of the administrative double counting of biodiesel from waste streams. An overview of admixed biopetrol (Bio-ETBE and bioethanol) and biodiesel is given in table 1 (page 9). The marginal increase of biodiesel volume used between 2009 and 2010 (0.08 PJ) compared to the growth of biopetrol (0.96 PJ) can be attributed to the fact that biodiesel met the minimum 2010 renewable share requirements as early as in 2009, whereas biopetrol did not.

In 2010, biodiesel manufacturers BioDsl in Breda, the Netherlands, and Biovalue in Eemshaven, the Netherlands, went into liquidation. Greenmills and Abengoa were taken into service in 2010. An overview of the initiatives, whether or not with new production methods or raw materials can be found on the Climate Neutral Gaseous and Liquid Energy Carriers website [GAVE 2011].

#### Recent permit applications and expectations

There are various biofuel projects in the design or start-up phase. The production capacity of biodiesel in the Netherlands is seriously underused [CBS 2010-b]. In 2011, a new NesteOil production site will be taken into service. The biodiesel is produced in accordance with a new process, called NExBTL, or the hydrogenation of vegetable oil.
Dutch consumption of solid biofuels for co-firing in coal-fired power plants and the consumption of bio-transport fuels are largely based on imported biomass. Figure 7 provides an overview of the production and consumption of and trade in wood pellets, biodiesel/mono-alkyl esters\textsuperscript{10} and biopetrol\textsuperscript{11}/ethanol. With regard to the production of biodiesel, it needs to be noted that although it is larger than domestic consumption, the vegetable oils for production are largely imported from abroad. In addition, until mid-2009, a lot of biodiesel was imported from the US (driven by US subsidy of biodiesel produced/processed in the US).

\textsuperscript{10}Biodiesel is a mono-alkyl ester. However, the volume of mono-alkyl esters traded is higher than reported under biodiesel alone. Therefore, the figures in figure 8 show the maximum volume of biodiesel traded.

\textsuperscript{11}Statistics Netherlands only reports on Dutch production and consumption of biopetrol, a mixture of bioethanol and ETBE.

However, following the anti-dumping measures implemented by the EU in July 2009, this trade was significantly reduced. Note that the trade balance in figure 7 is not always zero as a result of e.g. the processing of raw materials.

In 2010, the transit of biodiesel through the port of Rotterdam fell from 2.3 Mtons to 1.5 Mtons. The transit of ETBE rose to 0.9 Mtons whereas the transit of ethanol remained unchanged at 2.2 Mtons [Port of Rotterdam 2011].

Imported wood pellets are mostly used for co-firing in coal-fired power plants. Market parties state that the overrunning of contracts under the Environmental Quality of Electricity Production (MEP) scheme for co-firing between 2012-2014 and the as yet missing policy for the further large-scale deployment of biomass for electricity production are major impediments for (further growth in) the trade in wood pellets.

\textbf{Figure 7} Overview of the production and consumption of and trade in wood pellets, biodiesel/mono-alkyl esters and biopetrol/ethanol in 2009.
Market parties welcome an expansion in the logistical infrastructure in the Netherlands in order to become a more important player in the international trade, particularly as a transit country for wood pellets from North America for use on mainland Europe.

The market and government are currently developing technical standards for industrial wood pellets and standard trade contracts for wood pellets. The development of standards is an open process that falls under the responsibility of a standards committee. Therefore, contrary to legislation, a standard can never be entirely formulated and imposed by the government. See [NEN 2011] for further information on the development of standards.

The Renewable Energy Directive (RED) sustainability certification for liquid transport fuels is a point for consideration among the market parties for importing ethanol and biodiesel. The market parties indicate that the implementation of the RED is behind schedule, as a result of which there are insufficient approved systems for the certification of sustainable biofuels.
6. Pre-treatment technologies

Torrefaction
The interest in torrefaction has been growing in the last years, with particular interest shown by the energy companies. This has led to sales contracts and bank loans for torrefaction plants. In 2011, the combined production capacity is expected to exceed 100,000 tons/year. A strong growth in production capacity is anticipated for the years to come [Kleinschmidt 2010].

In 2010, the construction of three torrefied biomass plants was started. In the summer of 2010, Stramproy was the first to supply torrefied material. In 2010, Topell Nederland, a joint venture of RWE Innogy (49.9 percent) and Topell Energy (50.1 percent), built a torrefaction plant in Duiven, the Netherlands, which is expected to start production of a maximum of 60,000 tons of biocoal per year early 2011. The total investment amounts to approximately 15 Million Euros. In October 2010, Torr Coal in Sittard, the Netherlands, the third-largest producer of torrefied biomass in the Netherlands, took into service a production line with an output of 35,000 tons per year, located in Belgium, just across the border. Sales contracts for the torrefied products have been concluded with various buyers (electricity production companies).

Pyrolysis
Pyrolysis of biomass on an industrial scale is not yet available in the Netherlands. However, there are preparations for a pyrolysis plant on the Akzo-Nobel site in Hengelo, the Netherlands, and in Delfzijl, the Netherlands (partly on biomass) [Morgenstern & Groot 2010]. Major player in this field is the company BTG in Enschede, the Netherlands, which was granted the environmental permit for its pyrolysis plant in Hengelo, the Netherlands, in 2010.

Gasification
Gasification of biomass in the Netherlands is carried out in only a few locations. Biomass is gasified on a large scale in the Willem-Alexander plant of Nuon in Buggenum (province of Limburg). Waste wood is gasified in the Amer plant of Essent in Geertruidenberg, the Netherlands. In Nieuwkoop (province of Zeeland) you can find a plant (Torbed reactor) for the gasification of category B waste wood and the use of syngas for the production of heat. In addition, various Dutch companies are actively involved in the development of gasification plants (e.g. ECN in Petten, the Netherlands and Host in Enschede, the Netherlands).
7. Trends and developments

Based on the previous chapters, the following trends and developments are found:

- The Netherlands clearly show a rising line in renewable energy, in which bioenergy forms an important source (solid, liquid gaseous biomass).
- Government incentive programmes are aimed at continued growth by using a variety of sources. The government target is 14 percent of renewable energy in 2020. In accordance with the renewable energy action plan, this equates to around 300 PJ.
- In the past years, major increases could be seen in the production of electricity from solid biomass, the production of biomass (for electricity and heat production and feed-in into the natural gas mains) and the use of biomass in the transport sector. Heat generation by wood-burning stoves and waste incineration plants (AVIs) show only slight increases.
- Energy companies believe that co-firing of biomass will fall considerably in the next three years, parallel to the reduction in subsidy under the Environmental Quality of Electricity Production (MEP) scheme, unless new policies enable further growth of co-firing of solid biomass.
- The increase in the use of biofuels is driven by the Renewable Energy Directive. The Directive stipulates that 10 percent of fuel sales in transports in 2020 must be renewable. Expectations are that domestic use will increase further, in line with the growth of the obligatory minimum energy share of renewable sources in transport fuels of 4 percent in 2010 to 5.5 percent in 2014. This growth will be realised mainly through the import of transport fuels. However, it remains to be seen whether sufficient sustainably produced biofuels are available (for the Netherlands and Europe as a whole).
- In 2010, the development of green gas projects and green gas hubs is noticeable. Thanks to the inclusion of green gas in the Energy Production Incentive schemes, SDE and SDE+, and incentive programmes by the local authorities, interest in this technology is substantial. Green gas can be fed into the (existing) natural gas mains and/or used as transport fuel. In 2010, a capacity of 16 million Nm³/year was realised; the total capacity is approximately 37 million Nm³/year. Green gas accounts for less than 0.1 percent in domestic consumption of natural gas. In 2009, total natural gas consumption in the Netherlands was 46.3 billion Nm³.
- In addition to gasification and pyrolysis as established pre-treatment technologies, 2010 and 2011 appear to become the years of torrefaction in the Netherlands. With three large-scale operational plants in 2011, the Netherlands are global leaders in this field.
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The NL Energy and Climate change unit strengthens society by working on the energy and climate solutions of the future.