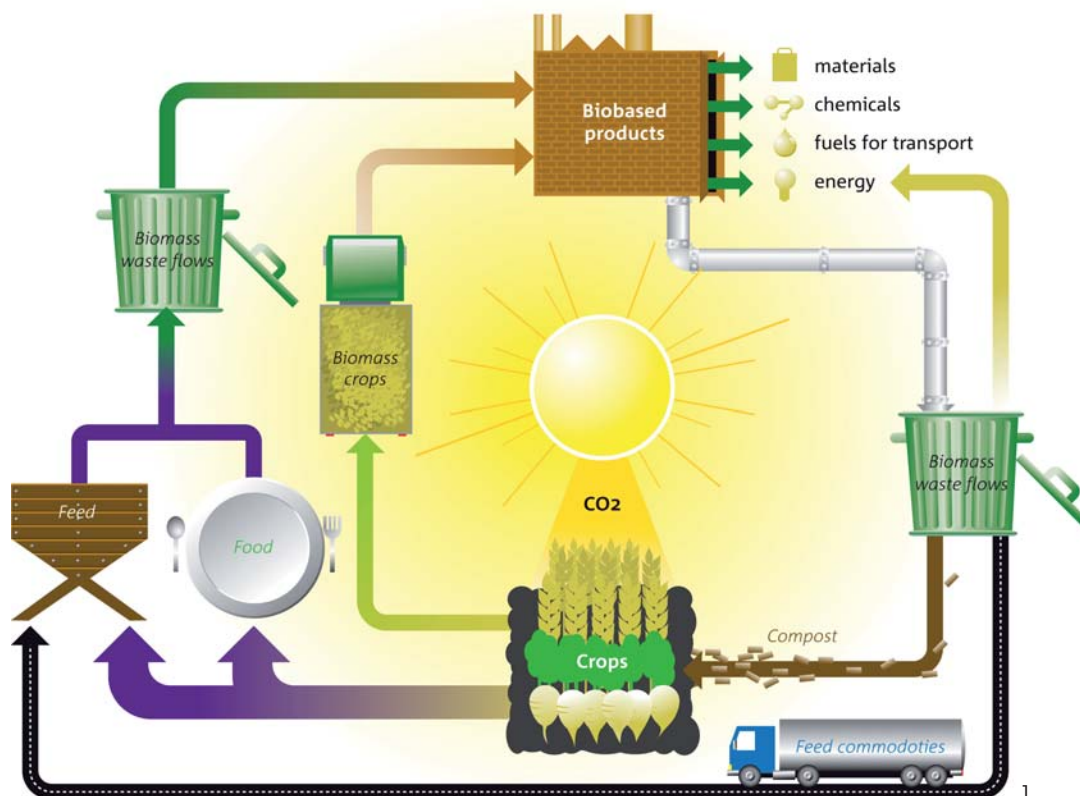


Government vision on the Biobased economy for energy transition

'Closing the chain'



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Foreword

There are increasingly greater and stronger signals that the climate change on earth is happening relatively fast. CO₂ and other greenhouse gas emissions that result from human activities are seen as the main cause (IPCC, 2007). The social pressures to considerably reduce greenhouse gas emissions are thus also increasing. Reducing the amount of fossil fuels used will reduce emissions of CO₂ and other pollutants, such as VOCs (volatile organic compounds), SO₂, etc.

Society is becoming more and more concerned about the increased dependence on imported fossil fuels. There is less security of supply, particularly with respect to oil and gas, as these are imported from a small number of countries in politically unstable regions of the world (IEA, 2006). In order to reduce our dependence on these countries and to improve the security of energy supplies, the demand for non-fossil-based fuels is increasing.

The fast economic development of countries such as China and India is currently aggravating the tension on the world oil and gas markets. Supply can barely keep up with the demand, so that political tensions in the Middle East, Eastern Europe or South America are quickly translated into considerable price fluctuations. In the interests of achieving a reasonable and stable pricing level, there is a significant demand for alternatives to conventional gas and oil.

In order to combat these problems, the Dutch Government is working towards an energy supply that is clean, reliable and affordable (Energy Report, 2005).

However, a sustainable energy supply does not happen overnight. The government therefore sees industry, civil society organisations and knowledge institutes as playing an important role in this development. However, a sustainable energy supply could also be accompanied by new dilemmas.

Towards a vision of a biobased economy

- the Cabinet is aiming for considerable energy savings of 2% per year (Coalition Agreement, 2007) that can be continued on a long-term basis;
- the Dutch Government is encouraging increased use of alternatives to fossil-based fuels, which also translates into a 20% sustainable energy target in 2020. In addition to alternatives for fossil-based raw materials, such as solar, wind and hydropower, biomass can also be used, as it is also renewable and, initially, a climate-neutral energy source;
- the Dutch Government is also using other measures aimed at a 30% CO₂ reduction in 2020. These objectives are defined in the programme entitled 'Clean and Efficient (new energy for climate policy)'.

The government's vision of a biobased economy covers a wider perspective, i.e. that of an energy transition, and is thus not an objective in itself. Six Platforms are currently working on the energy transition theme, and include representatives from industry, knowledge institutes and NGOs, all of which are focusing on achieving a sustainable energy supply.

If biomass is used on a large scale in the various sectors of the economy, this will create a so-called biobased economy. This is an economy in which companies – both national and international – produce non-food applications from biobased raw materials, or biomass. These applications cover transport fuels, chemicals, materials and energy (electricity and heat). Such a biobased economy needs to be developed in a responsible – sustainable – manner. The government has therefore developed sustainability criteria for the use of large amounts of biomass for energy purposes. Government policy is defined in a letter² from the Minister of VROM (Housing, Spatial Planning and the Environment) concerning the sustainable production of biomass for energy purposes (2007-2011).

It is not possible to say at this stage exactly what long-term contribution biomass can make to the total economy. This will apparently depend on a wide variety of choices that people make: here, elsewhere and in the future. It also depends on the circumstances that are not fully under our control. In order to cope with the uncertainties surrounding the use of biomass, it is necessary to develop a vision of the extent to which, and the way in which, biomass can replace fossil-based resources in the long term.

²) Lower House of Parliament, programme year 2006–2007, 30 305 and 30 800 XI, no.26.

Both in the Netherlands and in other countries, there is already some focus on the industrial activities that could form part of a biobased economy. If the government leans back and does not take action, it will be faced with all kinds of developments that may have possible negative effects. This is why the government is intervening now.

For example, one of the dilemmas currently faced by the Minister of Agriculture, Nature and Food Quality (Ministry of LNV) is the question: 'should we produce food or fuel'? The biobased economy mainly focuses on non-food applications, but there is some overlap between food and non-food, as shown in the drawing at the beginning of this document. The desire to achieve a sustainable energy supply in the Netherlands may, naturally, not lead to more hunger elsewhere in the world because we obtain our biomass from these countries. Competition with food production must be avoided. Biodiversity, both here and elsewhere, may also not suffer as a result of the need for a sustainable energy supply in the western world (including the Netherlands).

This government vision focuses on the optimal valuation and use of biobased raw materials. In other words, how can we simultaneously use various non-food products from the same biomass and/or residues from the agricultural sector. In order to achieve this, we need to conduct research, promote technology development, and bring the various parties together.

This vision does not mean that the government has all the answers. It connects, facilitates and regulates where necessary. The next step is to form coalitions with industry, NGOs and knowledge institutes in order to convert this vision into specific plans. Therefore this vision also includes a policy agenda, partially in relation to the programme 'Clean and Efficient (new energy for climate policy)'. This is the translation of the Coalition Agreement on CO₂ objectives per sector, and addresses the biobased economy in various ways.

We are grateful for the inspiration given by the Biobased Book on Energy Transition published by the Biobased Raw Materials Platform, which I received in April 2007. Together with this government vision, this provides a good start for future collaborative projects, in working towards a biobased economy: a green economy.

A handwritten signature in black ink, appearing to read 'Gerda Verburg', is written over a light blue horizontal line. The signature is fluid and cursive, extending from the left side of the line towards the right.

Gerda Verburg, Minister of Agriculture, Nature and Food Quality (LNV)

Also on behalf of the Ministers of Housing, Spatial Planning and the Environment (VROM), Economic Affairs (EZ), Development Cooperation (OS), and Transport, Public Works and Water Management (V&W).

Summary

The biobased economy is one in which companies – both national and international – produce non-food applications from biobased raw materials, or biomass. These non-food applications may be transport fuels, chemicals, materials and energy (electricity and heat). This vision does not cover the food applications. However, this does not mean that there is no relationship between the food, feed and non-food chains. Chapter 5, Policy Agenda, discusses this further. The figure on the front page of this document provides an overview of these relationships.

The letter³ from the Minister of VROM describes government policy with respect to the sustainable production of biomass for energy purposes (2007-2011). This letter forms the framework for maintaining the sustainability criteria for producing biomass for energy purposes, within the current Cabinet's vision. These criteria only concern the biomass flows covered in the aforementioned letter.

Both in the Netherlands and other countries, there is already some focus on the industrial activities that could form part of a biobased economy. This type of economy also overlaps other themes, such as climate, energy, trade, agricultural policy, food supplies, knowledge development, biodiversity, logistics and transport (fuels). The vision of a biobased economy provides a sketch of the current situation and the government's vision of its future role.

The government bases this on a number of starting points. However, the government's vision of a biobased economy is part of a wider perspective, i.e. that of a total energy transition, and is thus not an objective in its own right. Six 'Platforms' are currently working towards an energy transition, and include representatives from industry, knowledge institutes and NGOs, all of which are working towards achieving a sustainable energy supply.

The biobased economy can contribute to sustainable development, as the use of biomass could reduce greenhouse gas emissions. In the long term, the dependency on fossil-based raw materials from politically unstable countries could also be reduced. The biobased economy could lead to new economic opportunities. The Netherlands has a number of economic strong points that could be strengthened even further by a biobased economy. However, there are also a number of hurdles that require government intervention. These hurdles concern the lack of biomass sustainability, market failures and the lack of necessary technologies. There are also a number of questions surrounding the large-scale use of biomass.

On the one hand the government has high expectations of the biobased economy, but on the other hand, there are still so many

'unknowns'. It cannot be a good idea to use biomass in a non-sustainable manner, either here or elsewhere. The contribution that the large-scale use of biomass can make to the national energy and climate objectives needs to be gradually proven. Based on this realisation, the government has prudently initiated a parallel strategy that offers room for the further development of the biobased economy, but also accurately monitors the sustainability aspects.

The crucial question is: What is required to ensure that the biobased economy can develop sustainably, while focusing on the economic, ecological and social opportunities and risks? When answering this question, the government maintains the following starting points:

1. A contribution towards the Cabinet's greenhouse gas emission (CO₂) reduction objectives via the Clean and Efficient (new energy for climate policy) programme;
2. Matching the economic strengths of the Netherlands (chemicals, logistics, agricultural sector, food industry (by-products) and knowledge institutes);
3. Making an active contribution to the international collaboration in this field, particularly with respect to the position of developing countries.

Considering the opportunities and risks that the biobased economy offers, the government feels that it should be active in a number of areas. These concern the development of the sustainable biomass production, technology development (such as developing 2nd-generation technologies), market development and logistics. When working towards the development of a biobased economy, the government sees new opportunities for Dutch industry. These opportunities are primarily in high-grade applications, where various products are produced simultaneously (coproducts) from biomass. If the government wants to realise the objectives defined in the Coalition Agreement, then most of the biomass required will need to be imported. Together with the relevant stakeholders, the Dutch Government is trying to ensure that both imported and locally produced biomass is manufactured in a sustainable way. One of the sustainability criteria states that there should be no competition with food production. In order to implement the sustainability criteria, such as those developed by the project group Sustainable production of biomass, the Netherlands is collaborating with other EU Member States, such as the UK, Germany and Belgium. The Netherlands and other Member States are putting pressure on the European Commission to implement these sustainability criteria at a European level.

³) Lower House of Parliament, programme year 2006–2007, 30 305 and 30 800 XI, no.26.

With the introduction of the biobased economy, this will contribute to the partial replacement of fossil-based raw materials over the next few decades. The first steps will primarily focus on the use of residues.

Current knowledge regarding the technical potential of the biobased economy is still in its infancy. Scientific research into a stable balance between food production, chemicals and bio-energy is required in order to achieve a sustainable biobased economy.

The Clean and Efficient (new energy for climate policy) programme that was presented in the Queen's Speech (Prinsjesdag) 2007, forms an important financial framework for the current vision. The financing of projects for a biobased economy will often require funds from the Clean and Efficient programme, which will need to approve the application.

To accompany the government's vision that high-grade biomass applications in particular offer Dutch industry considerable opportunities, and that the required biomass must be produced sustainably, the government has set out a Policy Agenda that consists of four sections, which combine the existing policies and new initiatives of the various ministries. This new Policy Agenda will be specified further in collaboration with industry, knowledge institutes and NGOs. This will be a no-regret Policy Agenda.

1. *More efficient use of biomass.* Biorefining is thus a key technology, and includes the separation of biomass into various fractions that, with or without further processing, each have a specific application. Biorefining can lead to sustainable coproduction of food, animal fodder, energy, fuels and chemicals, in an economically sound manner and with a minimum of waste production.
2. *Sustainable biomass production, worldwide.* The aim is to ensure that the biomass used to replace fossil-based resources is produced and

processed in a sustainable manner. This applies both to biomass produced in the Netherlands or imported from elsewhere. Biomass for non-food applications does not necessarily require good agricultural soil, but can also be cultivated on bad quality and/or saline soil. This offers the possibility to improve the land in the long term. Under certain conditions the cultivation and initial processing of energy crops therefore also offers developing countries better opportunities for employment and generating revenue. Pilot projects are required in order to test the sustainability criteria in practice, and to start setting up sustainable production chains for (pre-processed) biomass. It is also important that (extra) research be conducted into the possible side effects of starting up large-scale biomass chains from developing countries.

3. *Encouraging the production of green gas and sustainable electricity.* In 2030 the New Gas Platform aims to replace 20% of the natural gas used with gas from sustainable sources, i.e. so-called 'green gas'. This is gas that is produced from biomass, and then processed into natural gas quality. It is currently possible to produce green gas via fermentation of biomass residues. Large-scale gasification of biomass will not be operational for at least five years. In the short term, the first steps can be taken via biological fermentation of biomass (manure, compostable waste, slaughterhouse waste etc.) This will prepare the way for larger-scale green gas production in the future. The Sustainable Electricity Supply Platform has prepared the transition path for bioelectricity and, within this framework, has defined a number of required technological developments.
4. *Market developments.* In order to expand the market acceptance of products based on biobased raw materials, the government can set an example via its own procurement policy. By 2010 the government aims to purchase only items that are completely (100%) sustainable. Local and provincial authorities have set themselves a target of 50%. In addition, the government also plans to encourage the use of innovative new products via its programme 'the government as launching customer'.

1. Introduction

The biobased economy is an economy in which companies – both national and international – manufacture non-food products from biobased raw materials, i.e. biomass. These may include transport fuels, chemicals, materials and energy (electricity and heat). The development of a biobased economy is partially under pressure from climate change, the dependence on politically unstable regions, and significant price fluctuations of fossil resources worldwide, which have accelerated the transition process. Dutch companies, knowledge institutes and NGOs are increasingly becoming involved in these developments, which offer opportunities for employment, revenue and improving the environmental quality. But there are also risks attached to this development, for nature, food production and the position of the developing countries. A number of questions therefore need to be answered:

1. To what extent does the cultivation and use of biomass lead to less use of fossil resources? To what extent does the use of biomass contribute to the security of our energy supplies?
2. Which risks are involved with the large-scale production of biomass, both here and elsewhere in the world? Can, and may, the use of biomass for energy purposes compete with food production and, if yes, under what conditions? What are the consequences for spatial planning? In the long term, can we cultivate sufficient biomass to meet the drastic increase in demand? Will this damage the biodiversity? How can we prevent any future damage to the biodiversity?
3. Where could biomass be used in the Netherlands? What opportunities does large-scale biomass use offer to Dutch industry? Which opportunities can the production and processing of biomass offer to developing countries, or are these actually a threat to these countries, and not an opportunity? What role can the Netherlands play among the supplying countries?
4. Which policy questions arise for the Dutch Government in the short and long term, if biomass is increasingly used as an alternative for fossil-based raw materials? What role does the Dutch Government play, now that biomass is increasingly being used, for example for transport fuels and for generating electricity? What initiatives exist at regional or national level, and/or should be set up to achieve a European development, with an appropriate European policy? What are the spatial consequences of using biomass for energy purposes, as what logistics issues will apply?

Chapter 5 of this document (Policy Agenda) provides a number of solutions or recommends instruments to answer a number of the aforementioned questions. Section 3.3 relates the questions to

priorities set out in the Policy Agenda. These, and possibly other strategic questions also require political and social debate.

The following diagram shows the first stages of a biobased economy. The raw materials are derived from crops such as corn, wheat and rapeseed, or from their by-products. These are split into primary by-products released from a (potential) source, such as waste from pruned plants, grass from verges and straw, and by-products that are released later in the chain (secondary by-products) such as beet pulp and beer waste, or tertiary by-products such as animal fats, manure and compostable waste. Algae form a separate group of raw materials. Processing these raw materials results in products for transport, materials, chemicals and energy.

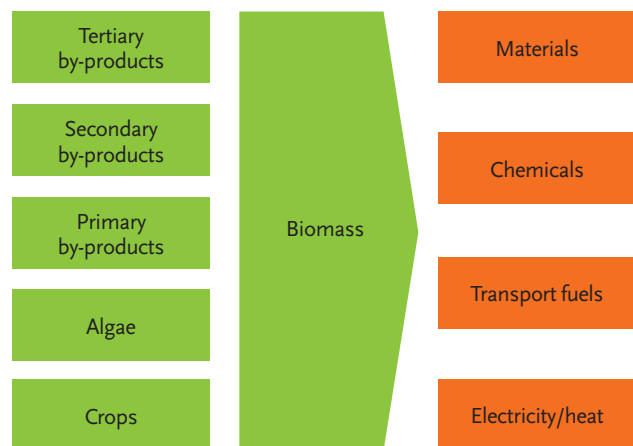


Figure 1: The first steps towards a biobased economy

Why a government-wide vision?

A government-wide vision is required because a biobased economy has several overlaps: with climate policy, security of energy supplies, and aspects such as trade, innovation, economy and competitive advantage, knowledge development, development cooperation, agriculture, food supplies, biodiversity, biotechnology, (agricultural) logistics and transport fuels.

Why do we talk of a transition?

A biobased economy concerns a transition from an economy that is primarily founded on fossil-based resources, to one that is primarily based on biobased raw materials. An increasing use of biobased raw materials will require not only technical solutions, but also modifications to the infrastructure and logistics, as well as changes to government regulations, the way in which companies do business, and consumer behaviour. For example, it is important for the competitive position, particularly of the chemical industry, that the

business community, the government and knowledge institutes focus efforts on white biotechnology and biorefining.

Why is it so important?

A biobased economy is important, for a number of reasons. Firstly, a biobased economy makes an important contribution to the government's CO₂ reduction objectives, as described in the Clean and Efficient programme. The objectives will not be feasible unless biobased raw materials are used. Secondly, biobased raw materials are one of the alternatives for fossil-based raw materials. Above all, it is economically and environmentally important that both the market and the government support high-grade applications. These are applications where all parts of the biomass are optimally used, and no parts of the crop are wasted. High-grade applications are not necessarily high in volume, but are very important in terms of added economic value. The use of these high-grade applications offers good opportunities for developing a biobased economy and strengthening the Dutch economy. The Netherlands has considerable knowledge and many companies focus on the production and processing of biomass into food, animal fodder and industrial products, as well as strong and competitive chemical industry and a unique logistical position.

Objectives of the Biobased raw materials Platform

The Biobased Book from the Biobased Raw Materials Platform (PGG) has inspired the government to develop its current vision. The PGG

states that, in 2030, biomass can meet 30% of the Dutch demand for raw materials and energy and that, in the long term, CO₂ emissions can be reduced by 59 Mton per year. In addition, replacing fossil-based resources with biobased raw materials can also contribute to a more sustainable chemicals and materials management, reduce waste production, reduce the use of toxic substances, and improve air quality. The Platform has indicated how a set of inter-related transition paths can help achieve these objectives (see Appendix 2).

Contents

This document consists of the following chapters. Chapter 2 sketches an environmental analysis of the Netherlands, showing that a biobased economy is, to a certain extent, already being implemented. Chapter 3 discusses the reasons for writing this document. These primarily concern the influence that a biobased economy can have for sustainable development, and the fact that a few clusters of difficulties have been identified that justify government intervention, and even make it necessary. Chapter 4 describes the government's vision in detail. Chapter 5 covers the Policy Agenda, which names the activities that will give a boost to the further development and implementation of the biobased economy. Finally, Chapter 6 includes a brief financial section. When implementing these activities, close collaboration will be sought between all relevant energy transition platforms.

2. Environmental analysis

The environmental analysis of the biobased economy shows that the Netherlands is in a unique position for such an economy: it has a strong agricultural sector, an internationally renowned chemical industry, excellent harbours and respected knowledge institutes. In addition to the large amounts of biomass that already pass in and out of the Netherlands, estimates show the potential of various types of by-products from the agricultural sector. An efficiency improvement in the food chain could also contribute to the increasing demand for biomass. This primarily means using less energy, using all residues and waste products, and achieving the same with the a wider range of raw materials.

Advantageous starting position

The 'agro cluster' - the combined agricultural and horticultural sector, together with the supply and processing industry, as well as trade and distribution - accounts for around 10% of the GDP (gross domestic product). There is considerable knowledge available on cultivating, refining and processing agricultural products.

In contrast to most other countries, the chemical sector forms the second largest (after the agro cluster) industry in the Netherlands. The country has an international reputation with respect to catalysis, process technologies and white biotechnology. The chemical industry is already using 5% biomass, increasing to 10% in 2010, as indicated by the Chemical Steering Group⁴. This group has formulated ambitious objectives for the chemicals sector, e.g. to double to contribution to GDP, and halve the use of fossil-based resources over the next 25 years. This will also mean focusing on renewable energy (which includes biomass).

Biomass is already being used to generate products such as electricity (currently 2.5%, though this percentage is increasing) and transport fuels (currently 0.4% (2006), increasing to 5.75% in 2010). These EU objectives, which have been accepted by the Netherlands as a commitment, will provide an important contribution to the development of a biobased economy.

The country's advantageous geographic position in relation to the large European market and its good logistical infrastructure ensure the supply of large amounts of agricultural products and crude oil that are extensively processed in the Netherlands into semi-manufactured products and end-products (foods, chemicals, plastics), which eventually find their way onto the European market. This gives the Netherlands an advantageous starting position for developing

a biobased economy. Such development offers opportunities to strengthen the economic position of the agro cluster, chemical industry, energy sector and the logistical position, certainly if the Netherlands focuses on knowledge-intensive, high-grade biomass applications.

With respect to the Dutch knowledge position, Wageningen University (WUR) can justifiably be called an internationally renowned knowledge institute. As far as biotechnology is concerned, the technical universities (TU Delft and TU Eindhoven) are also renowned knowledge institutes.

Current import and export of biomass

The Netherlands has a high agrarian production due to intensive agricultural and horticultural cultivation. In total (in 2000), the Netherlands imported 33 million tons of biomass (dry material) and domestically produced 31 million tons of biomass, primarily from the agricultural sector. This meant a total of around 64 million tons of (dry) biomass, of which 21.5 million tons was exported.

Biomass in electricity production

Co-firing of biomass in coal-fired power plants is already using biomass for electricity production. For environmental reasons, the amount of biomass (in 2030) will be limited to 20%, but – certainly if a number of criteria are met – this can probably be increased to 30%. Specific power plants (100% biomass-fired) form an alternative⁵.

Estimating potential primary, secondary and tertiary by-products

According to Rabou⁶ et al. (2006) the total potential for primary by-products amounts to up to 6 million tons of dry substance. This represents an energetic value of around 100 PJ. However, a number of issues will first need to be regulated or developed before these amounts can actually be used: the logistics of collecting, pre-treating and separating (biorefining), regulations and the technologies needed to convert this into useable substances/chemicals. Biorefining systems will need to be developed that maximise the advantages and minimise any disadvantages. According to Rabou et al. (2006) the Netherlands also has around 12 million tons of dry substance available (around 100 PJ) from secondary and tertiary by-products. Together with the primary by-products (100 PJ) this totals 300 PJ, which represents around 10% of the current energy consumption.

Estimating potential cultivation of energy crops

In addition to the residues available, some crops are already being

⁴) Businessplan Regiegroep Chemie 'Sleutelgebied chemie zorgt voor groei' (Key area of chemistry ensures growth), Leidschendam 2006, p.11.

⁵) The Biobased Book from the Biobased Raw Materials Platform, p.36.

⁶) Biomass in the Dutch Energy Infrastructure in 2030, L.P.L.M. Rabou, E.P. Deurwaarder, H.W. Elbersen and E.L. Scott. A report for the Biobased Raw Materials Platform, by ECN/WUR, 2006.

cultivated for a biobased economy. A significant portion of the starchy potato crops is being sold to the non-food sector. Crops are also being grown for use in co-fermentation, and plant oil is being produced for biodiesel and for use in the chemical industry. Which crops will be grown in 2030 will partly depend on the agricultural policy. Expanding cultivation for a biobased economy can certainly be expected. The production of aquatic biomass is also gaining a foothold, and this could also provide a considerable contribution. This also fits in with traditional Dutch skills of water management, as well as promoting the unique knowledge gained by the knowledge institutes in the Netherlands. Scientific research into the technical potential of bioenergy is required in order to develop a sustainable biobased economy.

Opportunities in developing countries

Due to the land prices and average scale size, cultivation of energy crops in the Netherlands will never form an enormous market. A large part of the (processed) biomass will therefore need to be imported. Studies show that developing countries in particular have good opportunities for producing biomass⁷. This also offers opportunities for the economic and social development of these countries. Collaboration is essential when building up this production, and the Netherlands can offer logistical and agricultural knowledge to assist this process. Opportunities for developing countries can therefore consist of:

- Cultivating perennial timber crops;
- Cultivating degraded or saline land that is not suitable for food crops;
- Cultivating annual crops, in combination with improved yield of food crops;
- Cultivating aquatic biomass;
- Improving traditional agricultural methods;
- Improving the logistics;
- Processing residues on site.

This creates a win-win situation, where both the Netherlands and developing countries can make the most of these opportunities.

However, the desire to achieve a sustainable energy supply in the Netherlands may not lead to additional hunger elsewhere in the world, simply because the Netherlands purchases biomass from these countries. Competition with food production should therefore be avoided.

Valuing by-products

As previously stated, by-products are split into primary by-products that are potentially released at the source (pruned plant waste, straw), and those that are released later in the chain (secondary by-products, such as beer waste and beet pulp), or those that are released after use (tertiary by-products, such as household waste, discarded frying oil, sawdust and manure etc.). The latter two types are already increasingly being used for economic reasons, for non-food applications. Many of these residues are used at low efficiency levels because the emphasis often lies on the need to get rid of the by-product, and application opportunities appear limited. New markets (such as bioplastics) and technologies (biorefining) allow applications with higher added value to be achieved.

Primary by-products can be allowed to remain on the land. If sales markets can be created then the supply will probably increase, and environmental and management advantages can be achieved.

Efficiency in the food chain: relationship between food and non-food

In addition to the aforementioned residues, large amounts of biomass become available if the Netherlands can increase the efficiency of the food chain. Of the 600 PJ of biomass and around 600 PJ of fossil-based raw materials that the Netherlands uses as input for food production, only 55 PJ benefits the population as consumable energy⁸. By lowering this input for food production, biomass is released for other applications. It also saves energy. Various industries have already started optimising their production processes. It would also seem logical to 'export' the knowledge gained in this field and thus try and achieve improved returns in the food chain.

⁷ 'A quick scan of global bioenergy potentials to 2050', E. Smeets, A. Faaij, I. Lewandowski, Utrecht University, 2004.

⁸ The Biobased Book from the Biobased Raw Materials Platform, p. 51.

3. Why does the government have a role to play in a biobased economy?

There are several reasons why the government has a role to play in the development of a biobased economy. Firstly, this contributes to the general sustainable development. Secondly, certain problems require government intervention. Thirdly, the large-scale use of biomass raises questions that demand a government response. The following section discusses these three reasons in more detail.

3.1 Contribution to sustainable development

The contribution to sustainable development is based on three dimensions: people, planet, profit.

People: In addition to continuing our prosperity and welfare levels, a biobased economy offers opportunities for new methods of working, employment and international collaboration, whereby a new élan is created with worldwide sustainability as the underlying basis. This applies both here and elsewhere. Cultivating biomass can offer new prospects for entrepreneurial farmers in this country. Since a large proportion of the biomass is derived from other countries, storage and distribution and logistics sectors will also experience increased employment opportunities. Elsewhere, particularly in developing countries, the cultivation and export of biomass will also lead to new economic development opportunities. Naturally it will be necessary to remain vigilant and deal with any negative effects on local circumstances, such as the country's own food production, and the affordability of energy carriers.

Planet: The signs that there is a relatively fast climate change on earth are becoming stronger. CO₂ and other greenhouse gas emissions caused by human activities are depicted by the IPCC⁹ as being the major cause of emissions. The social pressures to greatly reduce greenhouse gas emissions are continuing to increase. Additional use of biomass will reduce emissions of CO₂ and other pollutants (VOCs, SO₂ etc.). An actual reduction of CO₂ concentrations in the atmosphere can also be achieved by using photosynthesis, on a large scale, to bond CO₂ in biomass. This 'young fossil' can be stored or used instead of 'old fossil'.

Profit: Both the government and the business community see that the development of a biobased economy offers considerable opportunities for Dutch industry and the regions where this is concentrated. These opportunities are derived from the existing structure of the Dutch economy, which includes precisely the

stakeholders who would play a role in this development: the agricultural and agrarian industry (which supply the raw materials, and now also use various biorefining techniques), the chemical industry (for processing semi-manufactured and end products), the logistics sector (which supplies the connections) and the energy production (which plays a supervisory role in the entire process). No other EU country has this type of concentration of commercial capacity. Using the available knowledge of products, processes and markets it should be possible to work towards new production chains, new technologies and cleaner processes in order to make maximum use of biomass.

At the same time, society is expressing increasingly greater concern of the rising dependence on imported fossil resources. The security of supply is decreasing because oil and gas, in particular, are extracted from just a few small countries in politically unstable regions¹⁰. In order to reduce this dependence and improve the security of our energy supplies, the demand for non-fossil fuels continues to increase. Stocks of fossil-based raw materials are finite. For example, the Dutch gas fields are expected to be empty in 25 years.

Another factor concerns the fast economic development of countries such as China and India, which are currently aggravating the tension on the world's oil and gas markets¹¹. The supply capacity can barely keep up with the increased demand, which quickly translates into strong price fluctuations in the Middle East, Eastern Europe or South America.

Finally, in order to maintain our current profitable position in the aforementioned areas, we will need to:

- Develop new technologies and new forms of collaboration;
- Develop new economic chains and new value chains for new product-market combinations;
- Achieve new competitive advantages for the Netherlands.

3.2 Three clusters of obstructions

1) Lack of sustainable biomass

Large quantities of biomass will be required in order to realise the transition. Apart from the fact that there is uncertainty over the availability of the worldwide potential (organisation levels required, water management and biodiversity), the biomass flows can also be accompanied by various risks. The greatest risk is that domestic or imported biomass is not produced in a sustainable manner. It is

⁹⁾ IPCC report 2007, UNFCCC, Bonn.

¹⁰⁾ IEA World Energy Outlook 2004, Parijs, 2006.

¹¹⁾ 'Rising demand for energy, food, and raw materials by 2.5 billion Chinese and Indians creates an urgent need for a new path of industrialisation: based on new production and consumption technology with low consumption of resources and low environmental pollution, and the optimal allocation of human resources. The resource-intensive model for economic growth can't work in the 21st century.' State of the World 2006 Report, World Watch Institute, Washington DC.

important that we prevent the increased demand for biomass from damaging food production, reducing biodiversity, not reducing CO₂ emissions or leading to increased poverty. Two participants at the Round Table on Sustainable Development have recently published a report¹² indicating that certification of biofuels is a necessary instrument in the development of biofuel policy¹³. They also support the strengthening of research into 2nd-generation technologies .

Sustainable production of biomass is a necessary condition for achieving a biobased economy of any size, here in the Netherlands and surrounding areas, and (considering the production potential in the Netherlands and the EU) primarily also elsewhere. This is why various international initiatives are currently being developed, including a number of pilot projects. These are crucial, as they offer the opportunity to gain organisational and technological experience (production systems that meet sustainability criteria across the entire production chain) and allow to guarantee a reliable supply when increasing the scale. The Netherlands can play a pioneering role.

2) Market failures: external effects of fossil resources not sufficiently compensated

In order to achieve the transition to a biobased economy it is necessary to break the trend with the current, primarily oil, coal and gas-based industry and energy sector. This will not happen by itself. Biobased raw materials usually do not compete with fossil resources, as the environmental costs, such as climate effects, are not completely integrated into the prices of fossil resources. This market failure means that, until now, there have been too few new initiatives by the market that are independently feasible. The market failures – the Stern Review stated that climate problems form the greatest market failure ever¹⁵ – legitimises the fact that the government needs to take measures to encourage the replacement of fossil resources with green alternatives.

3) The necessary technologies are not yet fully developed: biorefining, biogas and high-grade applications for biomass and sustainable production

The further technological development of biorefining is important for the long term. This includes separating biomass into various fractions that are used for certain applications, with or without additional processing. Biorefining can lead to a high-grade sustainable 'coproduction' of food, animal fodder, energy, fuel and chemicals, on an economically sound basis with a minimum waste production. The following box provides an example. At this point in time there is too little insight available into the best production methods. This is partly due to insufficient use of knowledge from the chemical industry, and through lack of knowledge transfer between the business community, knowledge institutes and universities, also in other countries.

Project N-ergy, microbiological coproduction of N-chemicals and ethanol from biomass fractions

Initiator: Wageningen University (faculty group VPP)

Partners: Agrotechnology & Food Science Group, ECN and Westfälische Wilhelms Universität Münster and Easthouse Business Solutions B.V.

Contact person: Prof. J.P.M. Sanders

Time period: 1/1/2006 - 31/12/2009

EOS scheme, long term, Project number EOSLT02034.

Production of nitrogen-based bulk chemicals is a very energy-intensive process. In addition to naphtha raw materials, various other chemicals (e.g. chlorine and ammonia) are also required. A lot of electricity and natural gas is used in making these chemicals. From an energy-saving point of view it is far better to produce nitrogen-rich chemicals from biomass that is structurally similar to these substances. Thus biomass can achieve twice to four times better energy efficiency than using biomass to produce electricity or transport fuel. However, it has not yet been defined which technology should be developed for this type of large-scale biorefining, and what cost levels will be involved.

The technological development for using biobased raw materials was accelerated a few years ago, and resulted from the fact that competing with fossil resources had a better chance, due to the recent significant increases in oil prices. Many innovative technologies are required in order to achieve a complete transition to a biobased economy. One of the focal points for the medium and long term is the so-called '2nd-generation' technology. Using this 2nd-generation technology means that inedible parts of a crop can be used and there is no competition with food applications. This 2nd-generation technology is an example of efficient crop use. It will probably take another five to ten years before this technology is market ripe. At the moment only '1st-generation' technology is being used, which uses products such as sugar cane, rapeseed, palm oil, grains, corn and potatoes. More efficient technologies also need to be developed to use the residues that are available.

In the short term it is important to continue developing techniques to manufacture 'green gas'. With the current approach it will take another five to ten years before green gas can be supplied at natural gas quality via large-scale gasification or fermentation of biomass. This requires a cohesive R&D policy that also focuses on the SME (small and medium-sized enterprise) sector. However, the market development of green gas is equally important. This process can be accelerated by investing in research, developing systems and getting them market ripe. The following box provides an example of green gas production.

¹²⁾ OESO, Round table on Sustainable Development, Biofuels: is the cure better than the disease? Richard Doornbosch and Ronald Steenblik, 2007.

¹³⁾ Idem, p. 8

¹⁴⁾ Idem, p. 8

¹⁵⁾ Stern Review: The economics of climate change, Cambridge University Press, 2006.

Project Biomass to Green Gas (BioGG)

Initiator: Energieonderzoek Centrum Nederland (ECN)

Partners: Twente University, Groningen University, Halder Topsøe (Denemarken)

Contact person: Mr A. van der Drift

Time period: 1/1/2006 - 31/12/2007

EOS scheme, long term, Project number EOSLT03013

The conversion of biomass into 'green gas' or synthetic natural gas (SNG) makes the production possible of sustainable energy at any scale and almost any location. The circumstances in the Netherlands are particularly suitable for developing, commercialising and using green gas made from biomass. Potentially, green gas can be produced on a very large scale, before being stored, distributed and used to supply heat or transport fuel. The industrial production of green gas is currently in its infancy. The developments achieved so far have been based on coal and/or have a low efficiency. New (combinations of) technologies are required in order to achieve the best possible efficiency from biomass.

3.3 Questions regarding the large-scale use of biomass

As the questions in the introduction have indicated, the large-scale use of biomass also generates questions from society that will partially need to be answered by the government. The text in italics shows the priority theme in the Policy Agenda under which these questions are addressed:

1. To what extent does the use and cultivation of biomass, in addition to CO₂ benefits, lead to reduced use of fossil resources? To what extent does biomass contribute to the security of our energy supplies?

Policy Agenda, Section 5.5.a Monitoring

2. What risks are involved in the large-scale use of biomass, both here and elsewhere in the world? Can, and may, the use of biomass for energy purposes compete with food production and, if so, under which conditions? What are the consequences for spatial development? How can we prevent any damage to the biodiversity?
Policy Agenda, Section 5.3 Sustainable biomass production
3. Which biomass applications can be used in the Netherlands? What opportunities does large-scale biomass use offer Dutch industry? What opportunities does biomass production and processing offer to developing countries, or does this form a threat to them, rather than an opportunity? Which role can the Netherlands play in the supplying countries?
Policy Agenda, Section 5.1 More efficient use of biomass via biorefining; Section 5.4 Market development; Section 5.2 Green gas and sustainable electricity
4. Which policy questions arise for the Dutch Government, in the short and long term, if biomass is increasingly used as an alternative to fossil resources? What role does the Dutch government play, now that biomass is increasingly used, for example, as a transport fuel and in the generation of electricity? Have regional and national initiatives been set up and/or should research concentrate on a European development, with an appropriate European policy? Which spatial consequences result from the use of biomass, and which logistical questions will be raised?

These questions are partially answered in the various sections of this document.

As previously mentioned, these questions are addressed in the various sections of the Policy Agenda (Chapter 5), which discusses the instruments required, those that need to be developed, or provides guidelines for solutions. These and any other strategic questions also require both political and social debate.

4. Vision of the government's role in a biobased economy

Chapter 3 discusses why the government should play a role in a biobased economy. Chapter 4 indicates the government's vision of the role it should play. In formulating this role the government has been inspired by the recommendations of the Biobased Raw Materials Platform (see Appendix 3). This Platform has formulated the ambition (in 2030) to meet 30% of the total energy and raw materials demand in the Netherlands from biomass. In order to achieve this objective, the Platform has defined a number of transition paths. In achieving the ambitions of the Platform, this will make a significant contribution to achieving the goals of the Clean and Efficient (new energy for climate policy) programme, which results from the Coalition Agreement as CO₂ targets per sector. In formulating the Policy Agenda (Chapter 5) the government has taken these transition paths as the main starting point.

This vision of the biobased economy fits into the framework of searching for solutions to the climate problem, translated into CO₂ targets per sector, in the Clean and Efficient (new energy for climate policy) programme. These objectives are not feasible without the use of biobased raw materials.

The letter¹⁶ from the Minister of VROM defines the government's policy with respect to sustainable production of biomass for energy purposes (2007-2011). This letter forms the framework for maintaining the sustainability criteria for biomass production for energy purposes within the existing Cabinet's vision. The criteria concern only the biomass flows mentioned in the letter.

The introduction of the biobased economy over the next few decades will also contribute towards the (partial) replacement of fossil resources. The first steps will primarily be based on residues. The government's vision stresses that the biobased economy can lead to a win-win situation. After all, biorefining can lead to valuable materials being obtained from biomass; materials that can currently only be produced via far more energy-intensive and complex chemical processes. This alone will achieve considerable savings in fossil-based energy. The residues that are released through biorefining can be used to produce green gas and sustainable electricity, which will thus reduce CO₂ emissions even further.

At the same time, the government also realises that developing a biobased economy creates new questions that, as yet, cannot be answered. The large-scale use of biomass may also raise new dilemmas, e.g. with respect to sustainable cultivation and processing, both here and elsewhere. However, the remedy should not be worse

than the disease! The actual contribution to the national energy and climate objectives will only become clear in the longer term. The government's vision therefore consists of a parallel strategy: a clear support of developments towards a biobased economy plus research, consultation and monitoring to track the sustainability of biomass usage and, where necessary, modifying the approach accordingly. This prudent attitude has resulted in the Policy Agenda described in Chapter 5, also known as a no-regret agenda.

The role played by the government concerns encouraging the development and implementation of a number of key technologies, such as biorefining and white biotechnologies (Section 4.1), green gas (Section 4.3) and sustainable electricity (Section 4.4). In addition, the government primarily plays a role in contributing to the sustainable production of biomass worldwide (Section 4.2). Finally, the government can also help encourage market developments, for example through its procurement policy, and by acting as a 'launching customer' (Section 4.5).

The Clean and Efficient (new energy for climate policy) programme, which was presented in the Queen's Speech (September 2007), is an important framework for the current vision. Financial resources from this programme will be required to fund projects that are working towards a biobased economy. Approval will be required. Fundamental and applied research plays an important role in the development of a biobased economy. Recently published reports¹⁷ urge intensifying scientific research on a number of subjects that form part of the government's vision. The Ministers of OCW (Education, Culture and Science) and EZ (Economic Affairs) will form a commission to advise the government.

4.1 Biorefining and white biotechnology

Biomass consists of various components that, after separation, can each be used in its own way. This means that the use of biomass achieves a far greater effect and much higher economic value than when biomass is used without separating the various components.

In an unseparated form, biomass (residues) can easily be used for food, animal fodder, biogas fermentation and combustion applications. However, in order to use it for higher-grade applications such as transport fuels and bulk chemicals, the best output components need to be separated from the others. This means using biorefining techniques, which the government sees as a key

¹⁶ Lower House of Parliament, programme year 2006–2007, 30 305 and 30 800 XI, no.26.

¹⁷ De belofte van een duurzame Europese energiehuishouding, Energievisie (The promise of a sustainable European energy management system, Energy Vision) by ECN and NRG, August 2007. Duurzaamheid duurt het langst, Onderzoekuitdagingen voor een duurzame energievoorziening (Sustainability takes the longest, research challenges for a sustainable energy supply), KNAW, 2007.

technology. The government is therefore prepared to support the development and implementation of this technology. Biorefining (aimed at using optimum value) means that the substances or materials in an agricultural product are first isolated so that they can be used in high-grade products. The residues can be used for lower value applications, such as animal fodder, or for the production of 2nd-generation biofuels. The residues that are then left over can be converted into energy, particularly electricity. The agricultural product thus supplies far more raw materials than when it is used as a single product to generate electricity or heat. Figure 2 shows this 'value pyramid'.

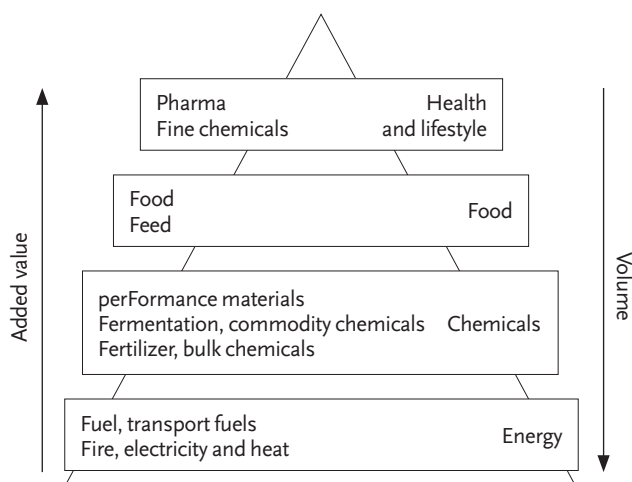


Figure 2: Added value of agricultural products, in 'FFs'.

White biotechnology is a second key technology, and uses living cells and their enzymes to produce chemicals, biofuels and energy from biomass on an industrial scale. These processes are cleaner and can reduce the amount of waste and energy consumption.

In order to compete with fossil resources, technologies for biorefining and white biotechnology will need to be drastically improved.

4.2 Sustainable worldwide biomass production

The Biobased Raw Materials Platform has calculated that, in 2030, extra imports of biomass will be required in order to achieve our self-formulated objectives. The Platform estimates this to be 60% of the total biomass required.

The government supports this strategy. Imports will be necessary, probably for a period of 30-50 years. After this, the abiotic sources will be particularly important for supplying energy (solar, wind etc.), but biomass will continue to be an important source for high-grade applications. The government's role is therefore to ensure that the biomass used for energy purposes is produced in a sustainable manner. This applies to the use of biomass from the Netherlands, as well as the large amounts of biomass imported from other countries.

4.3 Green gas

Green gas is made by processing gas from biobased raw materials into natural gas quality. It is currently possible to produce green gas by fermenting biomass residues and crops. Green gas can also be made via gasification of biomass, also known as SNG (synthetic natural gas). Large-scale gasification of biomass will not be operational for at least another five years.

In the short term, green gas production can at least be started via biological fermentation of biomass (manure, compostable waste, slaughterhouse waste, etc.). Setting up this process will help to prepare for larger scale green gas production in the future. The government is also prepared to support this key technology.

4.4 Sustainable electricity

Biomass is currently being used to supply today's electricity (2.5% of the electricity production). Within the framework of the biobased economy the supply of biomass available to produce electricity is expected to increase further. This expectation is based on the fact that biorefining will be introduced, so that the first valuable materials can be derived from biomass. The residues will be used to produce electricity, which is a high-grade form of energy. Gasification technology can play an important role in this development.

4.5 Market developments

The government also plays a role in launching biomass-based products onto the market, and fulfils this role by implementing commitments and regulations, such as those for transport fuels. The government can also use its procurement policy to create a market demand and set a good example, also known as becoming a 'launching customer'. Finally, the government plans to couple the market for sustainable electricity, gas and cogeneration developments to the SDE (an encouragement scheme for sustainable energy production), which will be available in 2008. In order to stimulate the development and market applications of innovative biobased products by small and medium-sized enterprises, the Ministry of LNV (Agriculture, Nature and Food Quality) started a pilot at the end of 2006 with an instrument that has been very successful in the USA, the so-called Small Business Innovation Research Programme (SBIR).

4.6 Non-food and food chain

The subtitle for the government's vision and the accompanying figure shows how all parts of the plant can be optimally used in the chain, based on the 'value pyramid' or biorefining, discussed in Section 4.1. If all parts of the plant plus all the residues from the animal fodder and food industry can be used in this way, there is no direct competition between food and non-food applications. The government aims to achieve this type of final situation, but it is questionable whether, in the end, all biomass can be processed and used in this way.

5. Policy Agenda

Based on the recommendations and transition paths set out by the Biobased Raw Materials Platform (see Appendices 2 and 3), the Dutch Government will focus on the following priority subjects. Together these form the no-regret Policy Agenda for a biobased economy:

- Biorefining;
- Sustainable biomass production, worldwide;
- Green gas and sustainable electricity;
- Market development;
- Various general subjects.

A number of subjects from the Policy Agenda have already been incorporated into the current policy. Implementing the Policy Agenda will take place in close consultation with the relevant Platforms. This can occur, for example, by formulating a number of business cases.

The Policy Agenda indicates which sections are new and which already exist in the current policy. New policy consists of the sections 5.1b, 5.1c, 5.1f, 5.1g, 5.3a, 5.3b, 5.3c, 5.4b, 5.5a, 5.5c and 5.5d. Existing policy, which will be intensified, consists of the other sections of the Policy Agenda.

5.1 Biorefining

The challenge

The challenge for the Dutch economy consists of two parts:

- Making optimum use of Dutch potential for biobased raw materials derived from domestic agriculture and from residues released from the production of food and animal fodder plus the management of forests and nature areas, as well as optimum use of imported biomass;
- Separating the biomass into various fractions using biorefining techniques and then manufacturing products that not only contribute to civil society objectives, but also optimise the economic value (coproduction). At this point in time there is no single route that offers the best opportunities. New 2nd-generation biofuels currently form an important product group. The 'pioneering role' played by transport fuels is logically the most simple, in terms of converting the existing infrastructure for fossil-based fuels into the required infrastructure for green products. The chemicals and materials sectors link into this by using the molecules from these biofuels as resources, and thus continuing the tradition of 'benefiting from the economy of scale' from the energy sector (previously via the petrochemical industry).

The challenges facing the government consist of formulating a framework for the further development of biorefining techniques, without defining specific technological choices. At the same time, encouraging the biobased economy is so urgent that, in the short

term, and together with the market, a 'no regret' set of demonstration projects will be required for biorefining aspects. Attention should also be paid to both large-scale and small-scale initiatives.

Obstructions

- New consortia are required for biorefining, with market parties that are not immediately recognised as partners, and that frequently have a different timeframe (agriculture, chemical industry, energy sector, logistics);
- Current government policy focuses entirely on using biomass to produce electricity or biofuel. This is not sensible, since optimising a single end product generally does not result in good chain efficiency;
- The government encourages R&D into biorefining techniques via various programmes, but this is only on a small scale and is very fragmented;
- Current political measures for supporting investment are not sufficient for market application;
- Dutch industry has many undepreciated investments in products and knowledge and, in order to prevent the destruction of its capital, is not willing to invest in new knowledge and technologies;
- With respect to scale, maintaining quality and security of supply, the biomass market must meet the needs of the new biomass processors.

What does the government do?

The government will implement the following seven activities:

a. Status document on biorefining

Biorefining is a focal point of the EOS (energy research subsidy) programme. At the end of 2006 this programme started drawing up the Status Document on biorefining: an overview showing what is meant by biorefining, and the current status of research into (and the application of) biorefining in the Netherlands (2007-2008).

b. Survey consortia for biorefining in the Netherlands

The next step will be for the Ministry of LNV (Agriculture, Nature and Food Quality) to conduct a survey of the areas within the Netherlands that offer the best opportunities for biorefining. The applications for biorefining in the Netherlands will be listed, and the current and expected demand for biorefining products will be mapped out. The biomass flows that are eligible for biorefining will be defined, with attention primarily focusing on the agricultural residues, plus those from the agrarian industry, nature management and forestry. The results will be used as a basis for determining which consortia should be set up. The Biobased Raw Materials Platform sees this also as one of its objectives (2007-2009).

c. Technology road map for biorefining

Based on the results of the survey, the Ministry of LNV will then facilitate the setting up of consortia of companies and knowledge institutes, by drawing up a 'technology road map' for biorefining. The government itself is also a stakeholder in the road map. Policy measures and resolutions also play an important role in determining the technology needs (e.g. the blending requirement for biofuels). This road map will specify certain objectives for 2030 and the years in between, including the consequences for R&D and financing. A link will be made with the current R&D programmes (EOS, Biobased Sustainable Industrial Chemistry (B-Basic), the second phase of the Netherlands Genomics Initiative and the UKR (unique opportunities scheme). It is important to set aside sufficient budget for the implementation of this road map. The Platform also sees this as one of its objectives (2008-2010).

d. Subsidising investments for innovative biofuels and coproduction

An investment scheme exists for innovative biofuels, for which the Cabinet has allocated 60 million euro for the period 2006-2010 (2007).

e. Supporting demonstration projects

At first the initiative lies with the market. The government will contribute by facilitating the formulation of coalitions and by subsidising the resulting demonstration projects, using existing or modified measures, for example the UKR scheme. The Platform also sees this as one of its objectives (2008-2011).

f. Supporting knowledge expansion on biorefining

The big PPS (public-private cooperation) research programmes that are relevant for biorefining will all cease within the next few years, while the research phase is not expected to be finalised then. This applies at least to bioethanol from lignocellulose. Even when the current programmes have been terminated, there will still be a need for financial support of R&D and to encourage public-private cooperation (2008-2015).

g. Implementing a macroeconomic study

The Platform's Wise Biomass¹⁸ report suggests that it is sensible to replace oil first, followed by gas. A macroeconomic study is required in order to specify the underlying calculations concerning these replacements. The preparation for this study has already started. The government considers the reasoning behind the Wise Biomass report to be valid, and underlines – just as the Biobased Raw Materials Platform – the importance of this macroeconomic study (2008-2009).

5.2 Sustainable biomass production, worldwide

The challenge

- Importing (pre-processed) biomass from other countries is necessary in order to achieve the objectives concerning the replacement of fossil resources. Biomass can not only be cultivated on agricultural land in these countries, but can also be grown on low quality and/or saline land, thus improving them. Genomics technologies are essential. Cultivating energy crops can offer

opportunities for farmers in these countries, including the rural areas in the EU, providing that production meets sustainability criteria and attention is paid to the development prospects in these countries;

- A well-functioning international market for sustainable biomass is therefore very important for the EU in general, and for the Netherlands in particular. International cooperation will need to be sought in the most appropriate international forums (such as the EU, FAO, UNCTAD, OESO, ISO and UNEP), in order to ensure that the elaboration of sustainability criteria can count on a broad level of support from stakeholders;
- Pilot projects, implemented together with a number of countries in various regions that have similar ambitions and sufficient biomass potential, are necessary for two reasons: to conduct practical tests of the sustainability criteria, and to take the first step towards building up a production and import chain for biomass;
- In addition to the greenhouse gas balance (part of the sustainability criteria), attention will also need to be paid to the balance of air emissions (in the chain). There is currently little knowledge available on this aspect.

Obstructions

- Not all sustainability criteria can be elaborated into measurable indicators;
- Despite the fact that the sustainable production of biomass is a necessary condition for achieving the Netherlands' ambitions for a biobased economy, the pilot projects need to fit into the existing consultations, and particularly with the culture in each country;
- Incorporating sustainability criteria for biomass into legislation is possibly limited by the demands to conform with EU and WTO regulations. The letter¹⁹ from the Minister of Development Cooperation and the State Secretary for Economic Affairs discusses the relationship of the so-called non-trade concerns (NTCs) and trade. A letter from the Minister of VROM²⁰ accompanied a report on this subject written by an official group, which was submitted to the Lower House of Parliament.

What does the government do?

The letter²¹ from the Minister of VROM describes the government's policy with respect to sustainable production of biomass for energy purposes (2007-2011). This letter fits into the framework for maintaining sustainability criteria set out by this Cabinet's vision. The criteria concern only the biomass flows mentioned in this letter.

The Minister of Economic Affairs, together with a Swedish counterpart, have asked the OECD (Organisation for Economic Cooperation and Development) to implement a study into the worldwide effects of using biomass, such as on the food supply in Africa.

The main sections of the policy concern the following:

- a. Setting up pilot projects in biomass-producing countries, in order to test the sustainability criteria on practicality and feasibility;
- b. Creating transparency by compelling companies to report on the sustainability of biofuels and biomass. This requirement would

¹⁸) Potential of Coproduction of Energy, Fuels and Chemicals from Biobased Renewable Resources, nov. 2006, Wise Biomass.

¹⁹) Lower House of Parliament, programme year 2006-2007, 25 074, no. 148.

²⁰) Lower House of Parliament, programme year 2006-2007, 30 305, no. 34.

²¹) Lower House of Parliament, programme year 2006-2007, 30 305 and 30 800 XI, no.26.

- push companies towards certification, because this would make it easier for companies to prove that they meet the necessary criteria;
- c. Develop an objective method of calculating greenhouse gas reduction;
 - d. Embedding sustainability at an international level. This framework would include the following activities:
 - collaborating with EU Member States;
 - applying the sustainability criteria in the EU;
 - setting agendas to focus on the development of international standards and certification;
 - collaborating with biomass producing countries;
 - supporting private initiatives;
 - monitoring the effects at macro level (biodiversity, food production, indirect land use, prosperity);
 - e. Determining legislative possibilities, including those in relation to the WTO;
 - f. Encouraging innovative and knowledge development, e.g. via the IPE (Energy Transition's Interdepartmental Programme Management).

The rise of the biobased economy and the attention to sustainability require the development of an integral vision regarding sustainability in relation to biomass. The focus on sustainable biomass for energy purposes can provide important insight into the opportunities and hurdles faced when developing and implementing sustainability criteria that meet WTO conditions, while trying not to damage the small-scale producers (conform the aforementioned Cabinet's point of view). Under the supervision of the Minister of Economic Affairs, the Cabinet is organising (autumn 2007) a public discussion on non-trade concerns. During the spring of 2008 this discussion will be translated into a revised viewpoint for the Netherlands, and will also be used as input to various international forums (WTO, multilateral environmental agreements, etc.).

5.3 Green gas and sustainable electricity

The challenge

The New Gas Platform has formulated the ambition to replace (in 2030) 30% of the natural gas with gas from biomass, the so-called 'green gas'. The government supports the direction taken by this ambition.

The Sustainable Electricity Supply Platform has prepared the bioelectricity transition path and, within this framework, has proposed several technological developments.

Obstructions

- There is currently no motivation to add green gas to the existing natural gas network in the Netherlands, so almost all the biogas is used to generate electricity;
- There is currently no certification system available to allow large-scale trading in green gas;
- In order to supply green gas to the low-pressure and medium-pressure natural gas network, the network companies need to agree on the quality of the green gas and the quality control system used;
- The regulations for (co)fermentation are not encouraging, and the permits for biogas projects are difficult to obtain.

What does the government do?

The government will implement the following four activities.

a. SDE (an incentive scheme for sustainable energy production)

The Minister of Economic Affairs has developed a new incentive scheme to subsidise the production of renewable electricity, cogeneration (total energy) and renewable gas, known as the SDE. The opening of this scheme depends on approval by the European Commission, and a final decision-making regarding the 2008 Budget.

b. Certification of green gas and products made from green gas

Using green gas would be much easier if a certification system were in place. The system for 'green' electricity could be used as an example. The Ministry of Economic Affairs is currently studying how such a system can be created (2008-2010).

c. Streamlining permit applications

In practice, permit application processes do not always run smoothly. The entire process could be streamlined and speeded up if the government were to find and resolve bottlenecks. The government will determine whether there are any structural hurdles to be overcome. This will be carried out in consultation with the relevant competent authorities, such as provincial and local authorities (2008-2011).

d. Expanding the positive list and fertiliser replacements

In practice, permit application processes do not always run smoothly. The entire process could be streamlined and speeded up if the government were to find and resolve bottlenecks. The government will determine whether there are any structural hurdles to be overcome. This will be carried out in consultation with the relevant competent authorities, such as provincial and local authorities (2008-2011).

5.4 Market development

The challenge

The main challenge is to increase market acceptance of products based on biobased raw materials. The government can set an example via its own procurement policy.

The government also hopes to encourage the use of innovative, new products via the programme 'the government as launching customer'. The advantage is that the government is not dependent on other parties.

Obstructions

- The market still has little experience with new biobased products;
- The role of small and medium-sized enterprises as innovators is not utilised sufficiently. In the Netherlands there is a lot of money available for R&D, but relatively little money for commercialisation (the so-called 'innovation paradox'). Ideas by university students and institute engineers therefore often remain 'on the shelf';
- Research shows that Venture Capital avoids risks and hardly ever invests in new technologies and new companies²².

²² Charles Wessner, The National Academies: Capitalizing on Science, Technology & Innovation, Washington DC, 2007.

What does the government do?

The government will implement the following activities.

a. Include biobased raw materials in the Sustainable Procurement programme

In 2010 the federal government plans to purchase only sustainable products (100%), while regional and local authorities have a target of 50%. Within the Sustainable Procurement programme SenterNovem is working on an inventory of relevant procurement measures and is trying to define the sustainability criteria for each measure. Biobased raw materials can play an important role in this process. This also applies to the 'government as launching customer' programme, which focuses on the market introduction of innovative and sustainable products. It is not yet clear whether this programme can promote specific developments such as biorefining. For example, the government can purchase paper produced from residues via biorefining. This fits into the framework defined in the letter to the Lower House of Parliament concerning the government's role as 'launching customer'²³. The Ministry of Defence notes that military (NATO) criteria for usability, fuels used and the storage thereof, are not compatible with large-scale blending of biofuels. Further technological development of both the fuels themselves and engine technologies used will be necessary in order to ensure the worldwide compatibility of armed forces.

b. Encouraging the development of biobased products

In order to ensure the development and market application of innovative biobased products by small and medium-sized enterprises, the Ministry of LNV started a pilot at the end of 2006 with an instrument that has apparently been very successful in the USA, the so-called Small Business Innovation Research Program (SBIR). SMEs have shown considerable interest. The programme set up (complete funding of R&D projects) and the simple application process appears attractive to smaller companies. An intermediate assessment will be implemented in February 2008. The first results from the tender, opened at the end of 2006, are positive: 17 project applications were submitted in five weeks, of which four have already been approved and finalised into a contract. Depending on the final evaluation, a larger-scale tender is expected to be organised (2007-2009).

The products and services developed within the SBIR can contribute to the development of criteria for procurement measures under the Sustainable Procurement programme. The government can also purchase the first applications.

c. Internationale samenwerking

It is important to create an international market in this field. This can be created through collaboration with partner countries for raw materials and intermediary products. This collaboration will be attempted by both the government and the business community.

5.5 General subjects

Finally, four general subjects are discussed, i.e. monitoring, public-private Venture Capital, encouraging white biotechnology, and

genetically modified organisms for non-food applications and logistic aspects.

a. Monitoring

The Platform recommends that the government should set up a monitoring system, whereby it is possible to determine whether the sustainability objectives relating to biomass production can be achieved. The government accepts this recommendation as part of the wider scale monitoring of energy transition.

b. Public-private venture capital fund

R&D alone is not sufficient to bring new technologies onto the market. In order to break the aforementioned innovation paradox, the Platform recommends setting up a public-private venture capital fund to finance investments in projects that fall under one of the transition paths.

An interesting development is the fact that the Risk-Sharing Finance Facility (RSFF) has recently been launched. This is a venture capital fund supported by the European Commission, together with the European Investment Bank. This facility harmonises with the subjects described in this vision document.

c. Encouraging biotechnology as instrument for the biobased economy

Various technologies, including biotechnology, are important in maximising the opportunities offered by the biobased economy. Modern biotechnologies can contribute to various biobased processes, such as bioethanol production, developing and producing 2nd-generation biofuels, producing fine chemicals, and growing crops that achieve a better energy efficiency, or are more suitable for processing into non-food products. The government encourages relevant knowledge and technical development via various programmes, such as B-Basic, and the Netherlands Genomics Initiative. These processes can make use of genetic modifications.

The response to the 2007 trend analysis of biotechnology that the Minister of VROM submitted to the Lower House of Parliament, partially on behalf of the Ministers of LNV, VWS and EZ in July 2007, gives more detail of the possible contribution that biotechnology can make to the biobased economy.

d. Studies into the possibility of using genetically modified organisms for non-food applications

Research into genetics (GMO and standard genetics) will be required in order to give a higher energy value to energy crops, and to modify them to comply with demanding cultivation circumstances²⁴. Government commitment will also be required for GMO approvals for the non-food sector. There is currently little acceptance of GMO throughout Europe, although not on all fronts. There is little acceptance of GMO food, because consumers see little added value for themselves. Medical biotechnology is widely accepted, because the advantages have already been experienced²⁵. GMOs for non-food applications appear to suffer from less resistance, certainly in terms of sustainability. The Dutch Government, together with Wageningen

²³) Lower House of Parliament, programme year 2005-2006, 27.406, no. 87.

²⁴) Duurzame productie en ontwikkeling van biomassa, (Sustainable production and development of biomass) PGG, August 2006, p.45.

²⁵) Idem, p. 44.

University and the European Association for Bioindustries (EuropaBio), are preparing an initial analysis of the current situation, and considering how the GMO discussion in Europe can be best implemented by the Netherlands.

e. Gain insight into the logistical consequences of the biobased economy

The development of a biobased economy will also raise logistical questions. If larger amounts of biomass are imported, this will require an efficient as possible logistical set-up. The development of biorefining, for example, could lead to companies that form a new chain moving closer to each other. The government also has a role to play in terms of logistics. A link with agrologistics seems likely.

6. Finances

This government vision includes integrating existing policies that need to be intensified with new policies. The Clean and Efficient (new energy for climate policy) programme, which was presented in the Queen's Speech (Prinsjesdag) 2007, forms an important financial framework under the current vision: 'During the period 2007-2010, an extra 58 million euro will be made available for the agricultural sector. Additional resources for innovation will be determined later, as part of the allocation framework via a separate FES (fund for strengthening economic structure). The Ministry of LNV has estimated this as 80 million euro for the green (biobased) economy, and 55 million euro for the horticultural sector'²⁶.

²⁶ Werkprogramma Schoon en Zuinig (Working Programme Clean and Efficient), pp. 38-40.

Appendices

Appendix 1

Terminology

Biomass

Plant-based or animal-based material, or material that is derived from plants or animals. Biomass has two important advantages over fossil resources. Firstly, biomass is renewable, and there is thus no danger of it running out. Secondly, biomass – in theory – can be used in a 'climate-neutral' way to supply energy. By using biomass instead of fossil resources, we can make our energy supply more sustainable.

1st and 2nd-generation biofuels

The term 1st-generation biofuels refers to liquid transport fuels that can be produced in a traditional or technically simple way. These biofuels are generally made from sugars or oils, thus the parts of the agricultural crops that are also used to produce food. First-generation biofuels cause 30-50% lower greenhouse gas emissions than fossil fuels.

However, 2nd-generation biofuels are made using a thermal and/or chemical conversion technique. All types of biomass can generally be used, thus also the residues. The greatest advantage is that 2nd-generation biofuels can be made from a much wider range of low-grade biomass: partly resulting in a better energy and CO₂ balance. These 2nd-generation biofuels are expected to produce 50-90% lower emissions – with a 30% margin of error (VIEWLS study). Above all, 2nd-generation biofuels compete less with food production, which is a relevant advantage for large-scale biomass import from developing countries. Only 1st-generation biofuels are currently being sold on the market. However, 2nd-generation biofuels are expected to become commercially available within the next five to ten years.

Bio-based economy

An economy in which the energy supply and production of transport fuels, chemicals and materials are mostly achieved using biomass.

Sustainable energy

Energy where renewable primary energy carriers are converted into secondary, i.e. usable energy carriers (Protocol Monitoring Sustainable Energy 2004).

Sustainable electricity

Electricity where renewable primary energy carriers are converted into electricity.

Appendix 2

Summary of the recommendations by the Biobased Raw Materials Platform

The government has asked the Biobased Raw Materials Platform to recommend how fossil-based raw materials can be replaced by their green counterparts. The Platform published its recommendations in October 2006. This consists of a set of ambitions for 2030 and describes which transition paths can be used to achieve these objectives²⁸.

Ambitions of the Biobased Raw Materials Platform

According to the Platform, in 2030 biobased raw materials will be able to meet 30% of the Netherlands' demand for raw materials and energy. This can form the basis for:

- 60% of the transport fuels (324 PJ)²⁹;
- 25% of the electricity demand (203 PJ);
- 17% of the heat consumption (185 PJ);
- 25% of the chemicals and materials (140 PJ).

The Platform assumes a considerable focus on saving energy, so that the energy consumption in 2030 is equal to that of 2000, i.e. 3000 PJ. In order to achieve this ambition, biomass will need to be imported, around 60% of the total required in 2030.

Transition paths

The Platform has defined the following transition paths to achieve this ambition:

- Sustainable production and development of biomass;
- Sustainable import chains;
- Coproduction of chemicals, transport fuels and energy;
- Production of synthetic natural gas (SNG) for the natural gas infrastructure;
- Innovative use of biobased raw materials and increasing the share of sustainable processes and products in the chemical industry.

²⁷⁾ Clear Views on Clean Fuels, SenterNovem, 2005.

²⁸⁾ 30% replacement of fossil resources in 2030, Biobased Raw Materials Platform, 2006.

²⁹⁾ Replacing fossil energy resources with biomass, in PJ, for end-use; process losses are not taken into account.

Appendix 3

Recommendations by the Biobased Raw Materials Platform

In addition to the transition paths, the Platform makes eight recommendations for the transition from fossil-based to green-based raw materials.

Recommendations by the Biobased Raw Materials Platform

1. The government and the market should introduce a certification system for biomass, elaborated according to developments and conditions for sustainability and actively aiming at collaboration at EU level.
2. The government and the market should together achieve (development) cooperation with a selected number of countries that sustainably cultivate and process biomass for our (large-scale) import.
3. The government should encourage all replacement applications according to their CO₂ reduction and economic prospects, thus creating a level playing field for electricity, heat, transport fuels and chemicals/materials produced from biomass.
4. The government should support the demonstration and implementation of projects such as:
 - Production of biofuels;
 - Production of synthetic gas from biomass;
 - Biorefining with residues from the ethanol-, biodiesel- and soya-processing industries.
5. The government should encourage the development and implementation of various forms of large- and small-scale biorefining, biomass gasification and biomass production, preferably in programmes that have close collaboration with the business community, both national and international.
6. The government and financial market parties should collectively set up a public-private venture capital fund for a period of 10 years, with an annual budget of 500 million euro, aimed at investing in projects that fit into the selected transition paths.
7. Set up a wide-ranging energy steering/monitoring group, supported by up-to-date scenarios such as those of the CPB (Netherlands Bureau for Economic Policy Analysis), to monitor transition activities and, where necessary, give these a boost.
8. The government, market and consumers need to make considerable energy savings.

In addition to the Biobased Raw Materials Platform, other platforms are also important to the biobased economy, i.e.:

- Sustainable Mobility Platform, due to biofuels for the transport sector;
- Sustainable Electricity Supply Platform, due to the use of biomass to generate electricity;

- New Gas Platform, due to biogas and synthetic natural gas (SNG, Substitute Natural Gas);
- Platform for Chain Efficiency, with respect to optimising the food and agricultural chains.

Appendix 4

Sustainability criteria for the project: Sustainable production of biomass

Developing sustainability criteria for biomass, by the project group Sustainable production of biomass

A broad-based commission of Dutch stakeholders has formulated sustainability criteria for biomass. The final report, published in August 2006 and submitted to the State Secretary of VROM³⁰, defined these sustainability criteria, for which there is considerable support. In the Cabinet's response to this advice and a plan of approach based on this, sustainability criteria are elaborated such that they can be applied in practice and tested further. It will then be necessary to continue monitoring that they are actually applied, preferably via a certification scheme at EU level.

The criteria and indicators are split into six themes:

- Greenhouse gas balance;
- Competition with food, local energy supply, medicines and building materials;
- Biodiversity;
- Economic prosperity;
- Social well-being;
- Environment.

These criteria are split into those that should apply from 2007 onwards, and those that come into force from 2011. The former includes minimum criteria, to prevent insufficient sustainable biomass entering the market. The criteria for 2011 are intensified to ensure active protection of nature, the environment, plus the social and economic circumstances under which biomass is produced and processed.

Appendix 5

International developments

Climate policy and biomass

Climate policy forms an important framework for the international developments concerning energy. The UNFCCC basis began in 1992. The Kyoto Protocol (1997) finally came into force in 2005. Western nations have committed themselves to reducing greenhouse gas emissions during 2008-2012 by a global average of at least 5% compared to 1990 levels. The EU (with a collective contribution of 8%) is a great supporter of this Protocol, which also forms the basis for the European CO₂ emissions trading scheme, which began in 2005. Emissions trading put a price on CO₂ emissions and stimulated

³⁰) Criteria for sustainable biomass production, final report by the Project group 'Sustainable production of biomass', The Hague, 14 July 2006.

³¹) Exceptions include the USA and Australia, although countries such as China and India have no commitments under this Protocol.

'decarbonisation'. Cross-border trading, eventually preferably on a worldwide market, can increase this further. Unfortunately there is still no international agreement on a follow-up to Kyoto, and no targets have been set for after 2012. However, it may be assumed that the climate problem will remain high on the international political agenda in the years to come.

Partly as a result of the climate policy, there is an increasing worldwide use of biomass for energy supplies. In 2002 the use of biomass, compared to the situation during the first oil crisis in 1971, has doubled, and is expected to continue rising up to 2030. Because global energy consumption will increase at the same rate, the percentage of biomass used in primary energy supplies, if current developments continue, is expected to remain around 10% in the period up to 2030.

Biofuels

The most eye-catching developments concern biofuels for the transport sector. The production of these fuels has grown exponentially over the past few years.

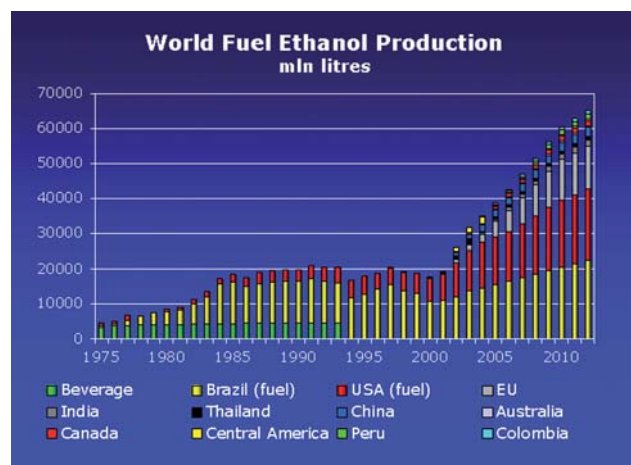


Figure 1: World production of bioethanol³³

Preference for 2nd-generation biofuels

Biofuels are split into 1st-generation and 2nd-generation biofuels (see Appendix 1). The 1st-generation biofuels are made from agricultural products that can also be used as food (grains, plant-based oils and sugars). However, 2nd-generation biofuels can be made from a much wider assortment of biomass, including woody crops or residues, such as stalks, that cannot be used for food production. Partly as a result of this, 2nd-generation biofuels have a much better energy and CO₂ balance than 1st-generation biofuels, and do not compete with food production.

Brazil: consistent bioethanol policy

The Brazilian Government has been encouraging the use of bioethanol (made from sugar cane) as an alternative to petrol since the 1970s. As a result of its consequent long-term policy, over the past 30 years the country has succeeded in reducing the production costs for bioethanol by over 60%, so that this is currently competitively priced alongside traditional petrol (at an oil price of \$ 40 per barrel).

In 2004 the proportion of transport biofuels in Brazil amounted to 14% of the total transport fuels used.

USA: boosts production of chemicals based on biomass

In the USA, the largest importer of crude oil, the use of biomass for energy supplies has received an enormous boost since the war with Iraq and hurricane Katrina. The most important motives behind this are the need to reduce the country's dependence on oil imports, and the need to support its domestic agricultural sector. The government has encouraged these developments, particularly the production of biofuels, over the past few years. The USA has already overtaken Brazil as the largest bioethanol producer in the world.

The percentage of biofuels, particularly bioethanol, in the US transport sector has increased to 3,5%.

The US Department of Energy (DOE) has defined two important objectives for the future:

1. To have ethanol from woody biomass as a competitive alternative to petrol in 2012. In order to achieve this, the DOE has allocated \$ 250 million for R&D purposes over the next five years;
2. To have 30% of the petrol consumption replaced with biofuels in 2030. The USA plans to increase its current biofuel production (5 billion gallons) to 60 billion gallons in order to achieve this.

In addition to biofuels, the American Government is also supporting the use of biobased raw materials to produce chemicals, materials and products. The Farm Security and Rural Investment Act was approved in 2002. The Federal Biobased Products Preferred Procurement Program was set up under this legislation, and compels all federal government institutions – with a collective procurement budget of \$ 400 billion per year – to purchase biobased products wherever possible.

Appendix 6 European policy

Objectives

Since 2006 the attention paid by the European Union to a sustainable, reliable and affordable energy supply has increased considerably, particularly after the 24-hour interruption of gas supplies to the Ukraine by the Russian Gazprom. In the Green book on energy policy, dated March 2006, the European Commission mentions sustainability as one of the three main objectives of European energy policy. Other objectives include security of supply by diversifying the energy mix in the EU, and competitiveness. In order to achieve these objectives, the Commission plans to encourage the use of competitive, renewable energy that is produced within the EU. The target, in 2010, is to achieve 12% sustainable energy of the entire energy consumed by the Member States (including heating, electricity and transport), where 21% of the electricity consumption is derived from renewable sources.

Biomass currently accounts for 3.9% of the energy supply in the EU, and 65% of the total percentage of renewable energy.

³²⁾ IEA, World Energy Outlook '04, Paris, 2006.

³³⁾ C. Berg, World fuel ethanol analysis and outlook, 2004.

On 10 January 2007 the European Commission published a Renewable Energy Road Map, which includes an EU target for sustainable energy in 2020 of 20%, and 10% biofuels, against a background of a 20% CO₂ reduction target in 2020.

Measures

The EU Biofuels Guideline came into force in 2003, and called upon Member States to aim for a 2% share of biofuels (in 2005) for the transport sector, increasing to 5.75% in 2010. This means a compulsory effort, not a fixed result. Member States may decide how they will achieve this: some countries use excise duty exemptions, others compel fuel suppliers to sell a certain percentage of biofuels as part of their turnover. In practice, many Member States stand behind these targets. However, several (France, Belgium) continue to protect their domestic biofuel markets against foreign suppliers.

In December 2005 the European Commission published its Biomass Action Plan, which aimed to encourage the development of biomass for energy purposes. It was agreed that the biofuel targets would not be reached. The Commission then defined a number of action points:

- In 2006 the Commission would consider how the use of biofuels could be encouraged;
- The Commission will evaluate the special support for energy crops under the framework of the Common Agricultural Policy, and consider expanding the list of crops that are eligible for support³⁴;
- The Commission hopes to find more opportunities to use animal by-products to generate electricity;
- The Commission encourages Member States to set up national biomass action plans.

The measures under the Biomass Action Plan should lead to the biomass usage in the EU (up to 2010) increasing from around 69 Mtons to around 150 Mtons of oil equivalents. According to the Commission, this is equal to expanding the amount of renewable energy by 5%, and should cause a significant drop in CO₂ emissions.

As a result of the points set out in the Biomass Action Plan, in February 2006 the Commission published an EU Strategy for Biofuels. This strategy aims to stimulate the production and use of transport biofuels in both the EU and developing countries. The strategy is more specific than the Action Plan, and includes seven steps for research, increasing market share, production, distribution and trade. In preparation for an evaluation of the Biofuel Guideline, in April 2006 the Commission carried out a survey among Member States and a broad representation of the other parties involved. The results of the evaluation are expected to form the basis for a revised Guideline in 2007.

The Member States confirmed their support for the Biomass Action Plan and the EU Biofuel Strategy during a meeting of the Agricultural Council on 20 February 2006. Specific follow-up measures regarding the Action Plan and Strategy are still being prepared.

In addition to using legislative measures, the EU also promotes biobased raw materials by supporting research and development in the form of public-private programmes. In 2007 the 7th Framework Programme began its seven-year term. Energy and the environment receive more attention than in the previous programmes, with a total of € 4.1 billion available. Biobased raw materials are explicitly mentioned within these themes.

The actual content of the Framework Programmes is partly steered by European Technology Platforms (ETPs), which are supervised by industry. Relevant ETPs for a biobased economy include Sustainable Chemical and Biofuels. In order to encourage better coordination and cooperation in national R&D programmes, the European Commission has set up the European Research Area (ERA) as a policy instrument. This includes an ERA-net for bioenergy, and EuroTransBio for industrial biotechnology.

Netherlands' point of view

- The Netherlands is a great believer in an open and transparent market for biomass and biofuels, and emphasises this within the EU. The current situation, where some Member States protect their biofuels market (via tendering and fiscal regulations) is seen as undesirable;
- In order to guarantee the origin and sustainability of biomass, the Netherlands considers that biomass certification should be regulated at EU level, in order to create a level playing field;
- The Netherlands also feels it is very important to encourage the development and use of 2nd-generation biofuels in the EU, for example via R&D.

The Lower House of Parliament has recently been informed (by letter³⁵) of the possible effects that the Netherlands' vision could have on the Common Agricultural Policy for bioenergy. Under the current circumstances the Netherlands is reserved about subsidising products from energy crops for biofuels, particularly as financial support per hectare. Encouraging bioenergy, also within the (future) Common Agricultural Policy, will primarily need to focus on increasing demand and strengthening research, informational campaigns, cooperation, and developing potential innovative technologies that are currently on the market.

³⁴) Under the framework of the Common Agricultural Policy, the cultivation of energy crops is stimulated in the form of a small premium (€ 45 per ha for up to 2 million ha). In addition, energy crops may be cultivated on so-called brackish land that is not suitable for growing food crops.

³⁵) Lower House of Parliament, parliamentary documents 2006-2007, 21.501-32, no. 185.

