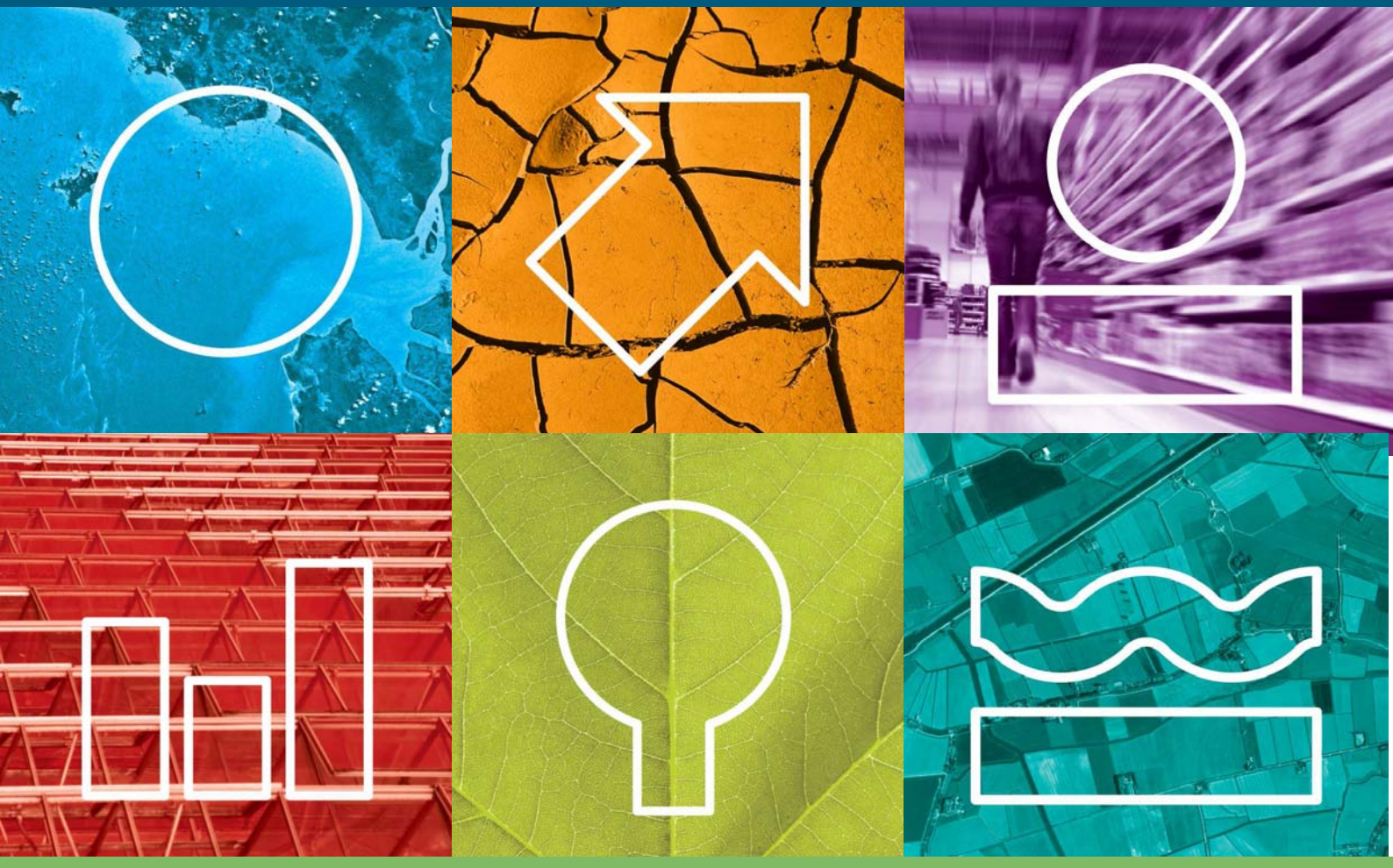
Dutch business opportunities in the Turkish biodiesel sector



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Rolien Wiersinga
Gulden Yilmaz (AFSG)
Wolter Elbersen (AFSG)

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Contents

Summary

To research possibilities for Dutch businesses to be involved in the Turkish biodiesel sector, a short literature study and unstructured interviews with sector stakeholders were performed.

Turkey is interested to develop its biofuel sector particularly to improve its security of energy supply, more than climatic based reasons. Turkey is currently importing most of its energy needs. About 50% of oil is used for transportation. Biodiesel has been produced chiefly from imported oilseeds. However, the quantities of locally produced rapeseed and to a lesser extent safflower has increased strongly in the last few years.

Biodiesel production grew from 2005 onwards but always remained under its capacity. In mid 2008 production was completely halted. Input prices were high and supporting policies were lacking. Mixing gasoline with biodiesel in Turkey is not mandatory.

Economic reforms following the financial crisis in 2001 and a new direct foreign investment law has improved the investment climate for foreign investors. Current possibilities for the Dutch private sector to be involved in the Turkish biodiesel sector are however very limited. Local demand for biodiesel is low and a clear policy focus on biodiesel is still lacking.

1 Introduction

The Turkish government has asked the LNV-Bureau to promote interest among Dutch investors and entrepreneurs in starting projects and companies in Turkey. This has been the reason to initiate a study into the advantages and disadvantages of the involvement of Dutch businesses in the development of the Turkish biodiesel sector.

This report evaluates the current biodiesel sector in Turkey. The focus is on local policies, entrepreneurial ambitions and agricultural, technical and sustainability issues. The findings in the report are based on a short literature study and unstructured interviews (see appendix 1) with Turkish stakeholders. Among others, there has been contact with Turkish businesses involved in the biodiesel sector, Turkish Association of Biodiesel Producers, Ministry of Agriculture and Rural Affairs and the Ministry of Energy. At the end of the report insight is provided into possibilities for Dutch entrepreneurs to invest either in the production and/or collection of primary products for biodiesel and/or in the production and marketing of biodiesel in Turkey. The recommendations at the end take into account the specific ambitions of The Netherlands and the EU in the field of biofuel development which relate especially to sustainability.

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2 The Turkish economy and agricultural sector

Turkey is a large country situated in both Europe and Asia with a land area of around 78m. hectares (Burrell and Oskam, 2005). It has 72m. inhabitants of which 20m. live in the three biggest cities Istanbul, Ankara and Izmir (Van Berkum and Kelholt, 2007).

Figure 2.1 Map of Turkey

Source: CIA (2008).

2.1 General and agricultural policy

Turkey is a secular parliamentary representative democratic republic, in which the Prime Minister is the head of government, and of a multi-party system. Turkey's political system is based on a separation of powers. Executive power is exercised by the government. Legislative power is vested in both the government and the Grand National Assembly of Turkey. The judiciary is independent of the executive and the legislature power. Turkey has been a member of WTO since 1995 and has a developing country status, meaning that Turkey qualifies for a relatively gradual programme of liberalisation with regard to agricultural trade. However, because of the Association Agreement between the EU and Turkey, Turkey has had some trade preferences for agricultural products by abolishing and reducing tariffs, though not for cereal products, sugar products and olive oil. Turkey itself has installed tariff quotas for agricultural imports of amongst others dairy and meat products, wheat, rye, barley, crude and refined soy bean oil, sugar, crude sunflower oil, crude rape-, colza- and mustard oil (Van Berkum and Kelholt, 2007).

With the agricultural reforms in 2000, Turkey has begun a structural adjustment and stabilisation programme. In recent years the Turkish agricultural policies are becoming more market friendly. Producer price subsidies are replaced with a direct income transfer programme within a limited time frame. The sales cooperatives are becoming more self-reliant through restructuring (Cakmak, 2004).

In 2005 negotiations started for Turkey to become member of the European Union. Turkey's candidacy for membership to EU has affected its agricultural policies. Protective trade policies in major crops combined with government procurement, input subsidies, and heavy investment in irrigation infrastructure on a fully subsidised basis have created a net inflow of resources from the government to agriculture which had actually negative effects on the sector. Turkey appears to model its future biofuel policies on the EU biofuels policies (IEA, 2005; Koyun 2007).

Contrary to the EU, Turkish agriculture continues to have insufficient production. The land cadastral is still not completed and land property relations are unclear. As a result the Direct Income Support (DIS) carries serious risks of decreases in production, and leads to more unemployment in the sector. So far, more than half of the DIS payments have gone to 17% of farmers, who are large land owners. On average, large land owners received 3.5 times more DIS than small land owners. As DIS payments are independent of production, it has negatively affected production and employment. Starting from 2006, the Turkish government decided to decrease the share of DIS in support, relating the DIS payments to production and to return to premium payments (Cakmak, 2003 and 2004).

Although the old rural policy experiences in Turkey were national projects and implementations, recent experiences have been supported externally. The most important one is the South-eastern Anatolia Project (GAP). GAP is an integrated and sustainable development project covering energy supply, big irrigation projects, agricultural mechanisation and tourism.

Other examples are the Ordu-Giresun Rural Development Project aimed at improving households' standard of living through the sustainable use of natural resources and the Sivas- Erzincan Rural Development Project aimed at the conservation and better use of natural resources as well as the establishment of effective links between research and extension sectors and farmers. ARIP (Agricultural Reform Implementation Project), co-financed by the World Bank, has made good progress in reorganising and strengthening extension services and improving the quality of research. Another example is the Diyarbakir-Batman-Siirt Rural Poverty Reduction Programme which is an ongoing social support and rural reduction programme in rural areas (www.tarim.gow.tr).

Two institutions falling under the Ministry of Agriculture are in place to assist the development of the agricultural sector in Turkey. Activities of TUGEM (General directorate of agricultural production and development) are focused on the development of projects for rural development, use of natural resources, setting up required facilities, preparing regulations to secure supply of inputs for the farmer and further development of privately owned agricultural initiatives. TUGEM provides different types of subsidies in the form of direct cash flow, materials and price compensation.

TEDGEM (General directorate of organisation and support) is responsible for the organisation of cooperations and unions in the agricultural sector. It further facilitates cooperation and development projects and also provides technical and financial help and subsidies for industrial installations. One current continuing programme is the no-return subsidy for industrial installations. This programme is now in its 4th tender and expects to give USD500bn. as subsidy. Subsidies vary between 75% to 25% of the total project costs. Another programme is focused on sustainable agriculture. TEDGEM provides 50% subsidy on the total investment costs. Subsidies are not legible for foreigners if they do not cooperate with a Turkish company. Four rapeseed biodiesel projects have been financed, in which focus was on processing of the raw material. A rapeseed producers' organisation already exists.

2.2 Economy

In 2007 Turkey's GDP amounted to USD657m., with an annual growth of 4.5% (World Bank, 2008b). Agriculture's share in Turkey's GDP was 9% in 2007 and is estimated to be 8.5% in 2008 (CIA, 2008).

Investment climate

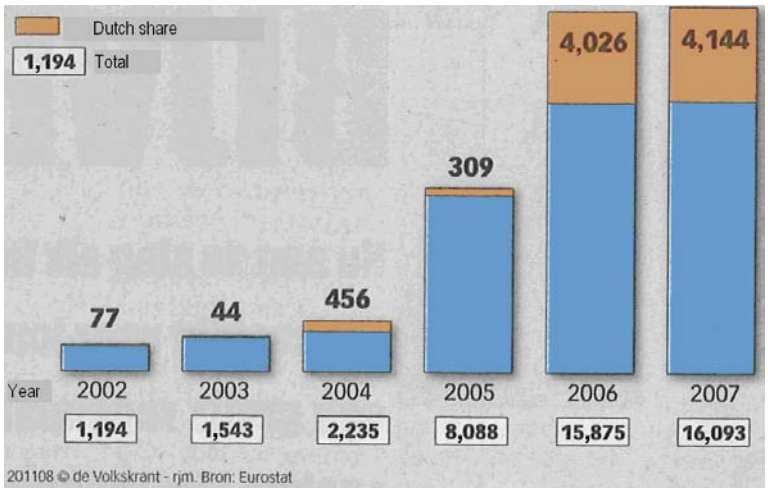
For a long time foreign companies have not been very eager to invest in Turkey due to instability in the country's political and economic situation. However, since 2001 the economic situation and the investment climate for both domestic and foreign investors have improved (Van Berkum and Kelholt, 2007). The law on direct foreign

investments was implemented in 2003, which safeguards equal treatment and investor's rights. Firms with foreign capital are accepted as Turkish firms. The law reduces bureaucratic procedures and allows more freedom and flexibility to investments. This new FDI law has had big impact as FDI was between €1-2bn., but increased strongly in 2005 to more than €8bn. and doubled in 2006 to €16bn. Large investments were made in the banking and real estate sector (van Berkum and Kelholt, 2007). As shown in picture below FDI in 2007 did not increase much. During 2008 FDI decreased and a further decline is expected in 2009 (Today's Zaman, 2009).

The World Bank ranking of countries for the 'Ease of Doing business' puts Turkey in 2008 on number 60 (out of 181 economies) compared to number 84 in 2005. Turkey scores low on dealing with construction permits due to the high number of necessary procedures and very high costs compared to OECD countries (not compared to its region). In Turkey it is more difficult to fire workers than in most other countries and other economies in the region. To close a business in Turkey is also more time consuming and costly than the average. On the positive side, it is relatively easy to enforce contracts and the time and costs to register property is extremely low in Turkey (Worldbank, 2008).

The Dutch share in the increasing FDI in Turkey increased substantially in 2006 and 2007 (see figure 2.2). According to the source of the data below this is particularly because of the removal of trade barriers. However, it is expected the growth has halted due to the economic crisis which hit the world globally in 2008. The economic growth in Turkey in 2008 was only 2% and is declining while the real inflation rate is estimated at 11% (de Volkskrant, 20-11-2008).

Figure 2.2 **Foreign investments in Turkey, in m€**



Source: De Volkskrant (November 20, 2008).

Trade

Exports from Turkey totalled €78.1bn. in 2007 of which 52.6bn. was directed towards the EU-27. The share of agricultural products in Turkish exports to the EU was 6.8% in 2007 and the share of energy was 1.4%. EU imports from Turkey are dominated by textiles and automotive products. Manufactured products constituted 77.2% of total exports in 2007 (EC, 2008). The main agricultural products which are exported by Turkey are (hazel)nuts, (dried) fruits, cereals, (unmanufactured) tobacco and citrus (Van Berkum and Kelholt, 2007).

Turkey imported for €122.7bn. in 2007, of which 46.9% came from the EU-27 (EC, 2008). Turkey is mostly importing from Russia, Germany and China. Import from the Netherlands has grown from €70m. to €170m. between 2001 and 2006. Among Turkey's main imported products are machinery, automotive products, chemicals, iron and steel, while the main imported agricultural products are unprocessed cotton, animal and vegetable fats and oils, oilseeds and cereals (Van Berkum and Kelholt, 2007).

The Netherlands are not a very important destination for Turkish exports or source for imports: only 2.2% of total exports in 2007 went to the Netherlands, and 1.6% of total imports came from the Netherlands (EVD, 2008).

Turkey has become a large net importer of oil seeds and vegetable oils since 1990 as can be seen in table 1 below. Only a small part of total imports and exports of oilseeds, vegetable and animal oils and fats is from or to the European Union through bilateral trade. The volume of Dutch exports of oils and fats to Turkey has been decreasing over time from almost 11.000 t in 2000 to over 2.000 t in 2004, even though 2003 showed a slight, short-term, recovery (MVO, 2005). The most important oilseeds imported by Turkey are soybeans and sunflower seeds (MVO, 2005). A total of 55.385 t of rapeseed and 6.182 t of rapeseed oil has been imported into Turkey in 2005 (Royal Netherlands Embassy, 2006).

Table 2.1 Value of Turkish exports and imports of oilseeds and animal and vegetable oils

	1990	1995	2000	2004	2005
Imports in million USD					
Oilseeds	32	204	233	470	625
Animal and vegetable oils	296	629	374	527	739
Exports in million USD					
Oilseeds	7	18	23	51	60
Animal and vegetable oils	138	325	99	205	405

Source: FAO (2008).

The prices per ton of oilseeds have been 132% higher in Turkey than the average price for oilseeds in the EU-15 from 1995 until 2003 (Burrell and Oskam, 2005). Turkey has a policy goal to be less dependent on oil crop imports by increasing the oilseed production.

Energy sector

Turkey depends for almost 80% of its total energy needs of 85million Tonnes of Oil Equivalents (TOE) on energy imports as shown in table 2. Virtually all oil and gas needs are imported and less than 50% of its coal needs are produced domestically. As shown in figure 3 Turkeys energy needs have increased rapidly since the 1970s. Natural gas use has been growing fast in the last decades.

Table 2.2 Energy Balance for Turkey in 2005 in kiloton oil equivalent

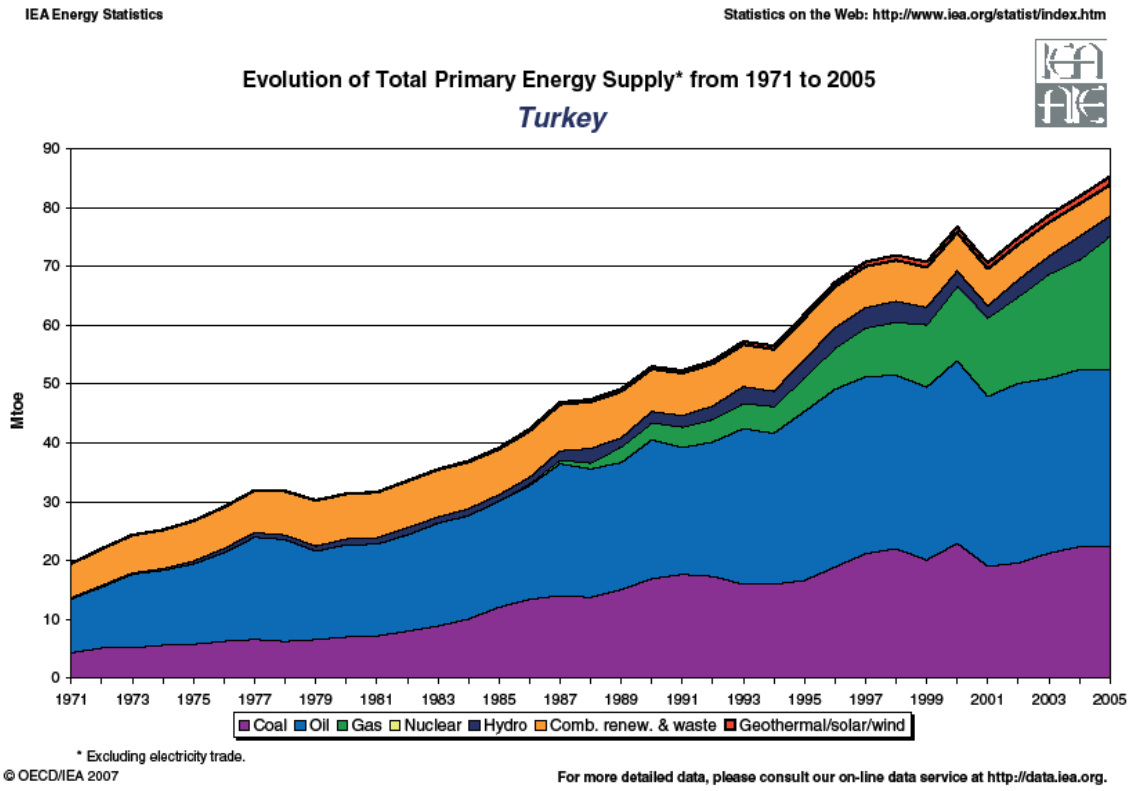
Supply and consumption	Coal	Crude oil	Petroleum products	Gas	Hydro	Geother-mal/solar	Combustible Renewables and Waste	Total
Production	10.482	2.231	0	738	3.402	1.397	5.356	23.607
Imports	11.720	23.223	10.419	22.127		0		67.543
Exports	0	0	-5.498			0	0	-5.653
International Marine Bunkers	0	0	-1.067	0	0	0	0	-1.067
Total Primary Energy Sources	22.470	25.605	4.290	22.785	3.402	1.397	5.356	85.205

Source: IEA (2005).

Almost 50% of oil is used in transport where the use of diesel has been growing due to more diesel driven vehicles and agricultural demand (IEA, 2005). The use of gasoline has been declining over the last 2 decades. Gasoline has been replaced partly by LPG. This explains the net imports of diesel and fuel oil and net export of gasoline. The trend of increased oil demands and especially a larger demand for diesel explains the larger interest in biodiesel than in ethanol (to replace gasoline). Due to its large dependence on oil imports Turkey has

made efforts to diversify supplies to reduce supply risks, including diversifying import sources and developing oil projects abroad (IEA, 2005).

Figure 2.3 Energy supply in Turkey from 1971 to 2005



Source: www.iea.org

Other biofuel developments

Bio ethanol production in Turkey is more developed than biodiesel production. Sugarbeet production in Turkey is large, in total 15.2m. MT was produced in 2005 (AIS, 2007). This was actually lower than before due to new policies that limit the sugar production. A number of sugar factories already have ethanol distilleries (AIS, 2007). Recently another type of project started with biomass in which the private sector (Tugas petroleum) and local government bodies are involved. More than 50% of Turkish poultry production takes place in the area of Duzce-Bolu. Energy from waste stream in this sector could be substantial. The calorific value of the waste stream was measured at 2,400 kcal/kg. Total investment has increased to €125m. It is expected that on completion 335,000 t of waste could be disposed, next to municipal waste (Bogut, 2008, pers. comm).

One of the characteristics of Turkey's economy is that a large part is informal, also in the agricultural and petroleum industry sectors. This may result in competition between legally acting organisations and informal organisations, where informal organisations may have lower production costs than legally acting organisations (van Berkum and Kelholt, 2007). Fuel smuggling is a major problem in Turkey. It is estimated that as much as one-fifth of the motor fuels used in 2003 were smuggled costing approximately USD2bn. in lost taxes (IEA, 2005). This is also shown by the large increase in the number of cars and trucks in Turkey, without showing a similar increase in fuel consumption (Royal Netherlands Embassy, 2006; MVO, 2005). The government of Turkey has introduced the use of a marker which shows if diesel has been legally or illegally produced when inspected (EMRA, 2007). This marker has been added to gasoline, gas oil and biodiesel types since 1 January

2007 at refining undertakings, distributors and processing licensees at the refinery exit, customs entry or at other facilities which are the domestic market entry points of the liquid fuel (EMRA, 2007).

2.3 Agriculture

Geography

Due to the size and the geographical position of Turkey, the climate differs within the country. In Istanbul and around the Sea of Marmara the climate is moderate. In Western and Southern Anatolia there is a mild Mediterranean climate. The climate of the Anatolian Plateau is a steppe climate (with large temperature differences between day and night). Rainfall is low and there is more snow. The climate in the Black Sea area is wet, warm and humid. Eastern Anatolia has severe winters with snow from November until April.

Agricultural land use

Cereals are the main agricultural crops in terms of acreage (see table 3). With respect to value, fruit and vegetable production separately are of equal importance to cereal production (TÜIK, In: AIS, 2007).

Table 2.3 Agricultural production in Turkey in 2007

Crops	Area (million ha)	Production (million ton)
Cereals	13.10	30.21
Pulses	1.27	1.49
Oil crops	1.96	1.05
Roots and tubers	0.16	4.28
Vegetables	1.00	24.45
Fruits	1.05	12.39

Source: FAO (2008)

Turkey has a vast land area of 78m. hectares of which 26.4% is available as agricultural land, excluding pastures (OECD, 2004). Most Turkish farms are still mixed. Only 6% of the farms are larger than 20ha while 65% of the farms are smaller than 5ha. Inheritance practices explain the small farm sizes and fragmentation. Land fragmentation results in lower opportunities for mechanized agriculture, production increase and stable production levels (van Berkum and Kelholt, 2007). Besides land fragmentation, low production levels are also due to lack of farmer education, poor technical capacities of the farmers, lack of good quality seeds and fertilisers, limited post-harvest facilities and insufficient road infrastructure (van Berkum and Kelholt, 2007). A considerable part of the land is left fallow, e.g. during rotation periods (Kleindorfer and Öktem, 2007).

Oilseed production in Turkey

According to Burrell and Oskam (2005), the area of oilseed production in Turkey increased between 1980 and 1990 and decreased again afterwards until 2003 (see table 4) after which it remained quite stable with a dip in 2005 (FAOSTAT, 2008). According to Kleindorfer and Öktem (2007), 7% of total cultivated land was planted with oil seeds in 2004, producing 500.000 t. As local consumption is 1.300.000 t per year most oil or oilseeds have been imported (see 2.2). The government aims to increase land planted with oil seeds to 14% (Kleindorfer and Öktem, 2007).

Table 2.4	Area in oilseed crop production, total area in field crop production						
	1980	1985	1990	1995	2000	2002	2003
Oilseeds (thousand ha)	1,362	1,490	1,557	1,537	1,319	1,430	1,377
Total field crops (thousand ha)	25,067	24,354	24,553	24,101	23,354	23,577	22,873
% area in oilseed production to total	5.4%	6.1%	6.3%	6.4%	5.6%	6.0%	6.0%

Source: Adapted from Burrell and Oskam (2005) and Kleindorfer and Öktem (2007).

Of all oil crops produced in Turkey, 46% is produced in the Southern Anatolian region. Oilseed production in Turkey mainly consists of cotton and sunflower (see table 2.5). The oilseeds best suitable for biodiesel are safflower and rapeseed (canola), see figure 2.4.

Table 2.5	Oilseeds production in Turkey in 2007	
	Area harvested ('00 ha)	Production ('000 t)
Groundnuts	260	86
Olives	6,200	1,525
Poppy seed	190	10
Rapeseed	110	25
Safflower	13	1
Cotton seed	7,350	2,500
Sesame seed	380	23
Soybeans	120	43
Sunflower seed	5,000	1,031

Source: FAO (2008)

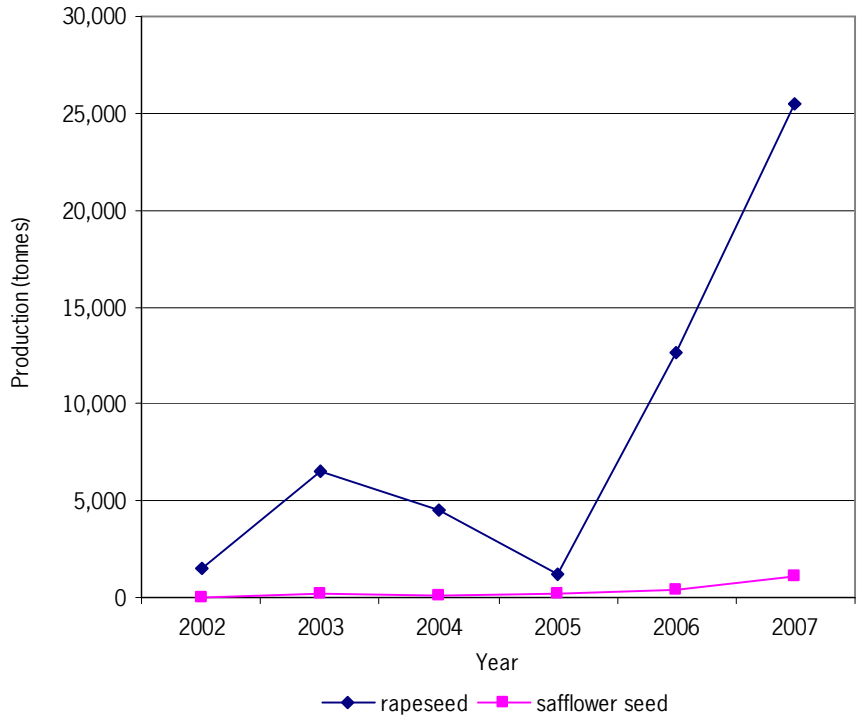
Figure 2.4 Rapeseed and safflower

Source: Sardi (2008) and www.biosurvey.ou.edu.

Rapeseed and safflower seed are produced in small quantities but production is increasing rapidly (see figure 2.5). Especially rapeseed is grown at a substantial area and production in 2006 was ten times the production in 2005. Production in 2007 shows a continuous increase in which production doubled compared to previous year. Safflower is produced in much smaller quantities but production in 2007 tripled compared to previous year.

Rapeseed and safflower oil are expected to gain in importance in oilseed production. Production is easy, requires low inputs and may be cultivated relatively efficiently on small plots (Kleindorfer and Öktem, 2007).

Figure 2.5 **Production trend of rapeseed and safflower seed**



Source: FAOSTAT (2008).

3 Turkish biodiesel sector

Biodiesel is a renewable bio based alternative to fossil diesel. Generally biodiesel is produced by transesterification of vegetable oil with methanol using caustic soda as a catalyst. The product is a so-called fatty acid monoalkyl esters abbreviated FAME with glycerine as a by-product.

The major reason why vegetable oils and animal fats are transesterified to monoalkyl esters is that the kinematic viscosity of the biodiesel is much closer to that of petro diesel. Advances in engine technology and reduction of exhaust emissions cannot be accomplished if the fuel does not comply with certain minimum quality requirements. Like petro diesel, biodiesel has to have a certain set of properties that fall within a limited range in order to be suitable as a transportation fuel (Blaauw and Elbersen, 2008). The type of feedstock (oil) is an important factor determining biodiesel quality. Rape (and safflower) oil are better suited for colder climates than other oils such as soy, sunflower, palm, etcetera.

In Turkey (like in many other countries) there has been a growing interest in biodiesel by the public and private sector since 2000. According to Kleindorfer and Öktem, (2007) the key drivers for biofuels are the same as for energy in general; they are concerns over security of supply (biofuels allow a more diversified mix, even if imported), climate change, and cost (although reliant on subsidies currently, the expectation is that with carbon taxes eventually factored in, biofuels will be cost competitive). Other drivers encountered are the larger demand for diesel than for gasoline which leads to the need to import diesel. Biodiesel could offset part of this import demand. Though no real targets have been set for biodiesel, EU targets are leading.

3.1 Biodiesel policies

There are several regulating bodies in Turkey which are relevant to mention with regards to the biodiesel production and related activities. These organisations fall under different ministries being Ministry of agriculture, Ministry of energy, Ministry of environment, Ministry of finance and Ministry of industry. The shared responsibilities among the different ministries are seen as a disadvantage as in some cases delays or miscommunication can occur. Furthermore, different ministries tend to work within their own focus areas which may in some cases cause conflicting situations such as in the case of tax reduction. Currently oilseed crops fall under the Ministry of industry, not under the Ministry of agriculture. The production of biodiesel with used oil as input falls under the responsibility of the Ministry of environment. The Ministry of finances is responsible for land issues. The Ministry of Energy and Natural Resources is mainly focused on renewable energy, energy efficiency and sustainability in using natural resources.

The Electricity Market Regulatory Authority (EMRA) had been established as per Law no. 4628. With the enactment of the Petroleum Market Law no. 5015 and Liquefied Petroleum Gas (LPG) Market Law no. 5307, the Authority has been commissioned to regulate and supervise the petroleum and LPG markets. The objective of these laws is to establish a financially viable, stable and transparent energy market and to ensure the independent regulation and supervision of the market in order to provide sufficient electricity, natural gas, petroleum and LPG of good quality to consumers, at low cost, in a reliable and environmental friendly manner. EMRA's activities included preparing the regulations and laws as well as preparing reports and statistics.

Up to 2003, biodiesel was not subject to taxes as biodiesel was presented as an extension of food processes (Kleindorfer and Öktem, 2007). From 2003 onwards, biodiesel production is managed by the government of Turkey under the Petroleum Market Law (no 5015), introducing a special consumption tax of TRY0.65 (€0.34) per litre (Ministry of Energy and Natural Resources, 2003). Stakeholders however are lobbying for biodiesel to be organised under the Renewable Energy Law as the special consumption tax would then be circumvented. Tax advantages exist for locally grown oil seeds but not for imported oil (Kleindorfer and Öktem, 2007). Furthermore it is currently permitted to mix up 2% biodiesel with petroleum diesel without paying taxes for this amount (Kleindorfer and Öktem, 2007). In general the private sector states that the petroleum law is not successful in promoting biodiesel. The sector is looking forward to raise the amount of biofuel with tax advantage

to be mixed with regular fuel. Currently the Ministry of finance is not willing to increase the tax advantage to a higher extent (the Ministry of energy, environment and agriculture do agree on the proposed tax policy).

Auto biodiesel and fuel biodiesel must be compatible with the TS EN 14214 and TS EN 14213 standards, respectively. According to the TS 3082 (EN 590) standard, auto biodiesel can be blended with fuel not more than 5% of the total volume. This biodiesel added fuels can be used in any vehicle under the protection of the existing guarantees. The biodiesel production norm of the European Union (EN 14214) is followed by Turkey. According to Kleindorfer and Öktem (2007), only 7 parameters from the 21 of the European norm are a requirement within the standard TSEN 14214. In accordance with the related regulations, it is allowed to produce biodiesel from vegetable oils in recycling centres.

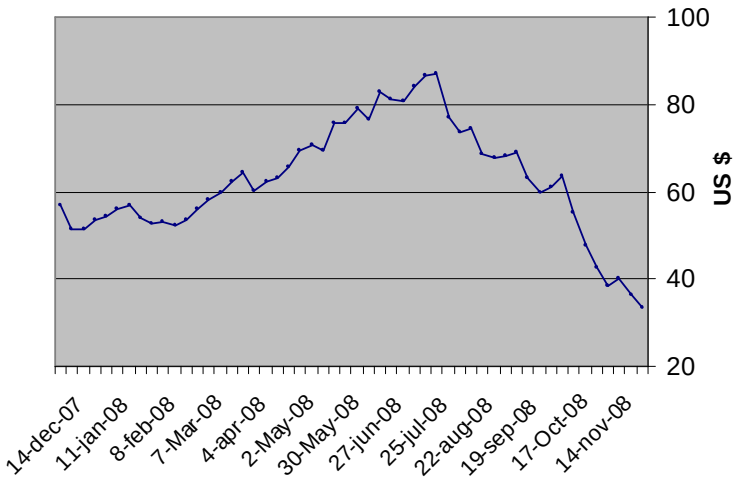
3.2 Biodiesel production and trade

The availability of oilseeds for the biodiesel sector depends on food and oil prices and the produced volume of oilseeds. Biodiesel companies mostly use rapeseed. However, there is a lack of local rapeseed production (and other suitable biodiesel oilseeds) causing companies to import rapeseed oil. As a result these companies don't receive government support which is only aimed for locally produced products. Rapeseed is a deep growing crop resulting in the occupation of land for a very long time and therefore not very popular among farmers. Oilseed production is furthermore a problem due to lack of organisation and market information.

Next to being a raw material for biodiesel, rapeseed oil is also used in the food industry. The rapeseed oil available for biodiesel production is severely influenced by food industry prices especially when no long-term contracts between oil producers and biodiesel distributors are agreed upon (Kleindorfer and Öktem, 2007). Safflower production in Anatolia has no competition with a food crop, possibly though with barley and oat.

Both the feedstock as the oil prices determine whether biofuel production will be profitable or not (next to subsidies). Biodiesel is competing with the food industry for oil and in the petroleum sector with the transportation fuel. Biodiesel production is only profitable when food industry prices for oil is low and when transportation fuel prices are high. How the oil prices will develop in the future is to be seen. Some claim that the oil price will be high due to increased demand in Asia and depleting supply resources, others claim that the price will be low as current capacity is limited because of too few investments in the past (Banse et al., 2008). The rising oil price in the first half of 2008 is falling unexpectedly rapid and is now lower than one year ago (see figure 3.1).

Figure 3.1 **Crude oil total return from November 2007 until November 2008 a)**



a) The graph represents the S&P GSCI Crude Oil Total Return Index reflecting the returns that are potentially available through an unleveraged investment in the West Texas Intermediate (WTI) crude oil futures contract plus the Treasury Bill rate of interest that could be earned on funds committed to the trading of the underlying contracts.
Source: www.ipathetn.com (November 14, 2008).

Biodiesel production

By January 2, 2008, there were 55 licensed biodiesel plants in Turkey (*www.dbtarimsalenerji.com*). This was a large increase from 2007 when only 22 companies received a licence (Kleindorfer and Öktem, 2007). As many operating biodiesel plants were small or medium sized, a regulation came into force that requires a company to have a minimum of 500,000 YTL in capital when applying for a production licence (Royal Netherlands Embassy, 2006). Applying for this licence is a cumbersome business, and many interested parties in 2007 have withdrawn from acquiring the licence (Kleindorfer and Öktem, 2007). According to interviewed companies it takes 6-7 months to get an operating licence.

In 2005 an association for alternative energy and biodiesel producers, Albiyobir, was established. It currently has 67 members in 39 cities. The objective of Albiyobir is to express the importance of Turkey's natural resources and facilitating the development of the biofuel sector in order to provide continuity in the energy supply in a sustainable manner and reduce foreign dependency. Albiyobir follows the global developments and communicates this information with its members and tries to help the regulatory bodies in better organisation. Albiyobir further organises symposia, panels, conferences, technical courses and publishes a magazine.

The main raw material for biodiesel production in Turkey is rapeseed with a substantial growth in production since 2005. Biodiesel production figures are a bit ambiguous, as different parties mention different numbers. Turkey's total biodiesel production capacity in 2005 is estimated to be in between 450,000 and 878,000t per year (Kleindorfer and Öktem, 2007). However, the actual production of biodiesel is estimated much lower at 90,000t in 2005 and decreased sharply to 10,000t in 2006 (Royal Netherlands Embassy, 2006) and to a complete stop of production in mid 2008. Clearly Turkey has a large biodiesel conversion capacity of which only some 7% of the available capacity of crushing and refining installations was used in 2008 due to high cost of feedstocks. Although some subsidies exist (also for oilseeds), it was not enough to boost the production (cultivation of oil crops approximately 10 cent/kg) probably due to high costs, lower yield and uncertainties in the expected yield due to fluctuations as a result of climate change (TUGEM, private communication).

Based on an estimated 1,900,000ha of unused and suitable land Kleindorfer and Öktem (2007) estimate the biodiesel production potential of Turkey at 1,250,000t per year. This may be somewhat high since the best suited crop (rape) can only be grown once per 4 to 6 years in a rotation system and is not compatible with certain crops like sugar beet.

Within the South-eastern Anatolia Project (GAP) covering 9 provinces in southeast Turkey, a proposal for biodiesel production has been submitted. The biodiesel proposal aims to build a biodiesel processing factory with an annual capacity of 30,000t biodiesel (and 6,588t glycerine) by investing €724,000. The calculated annual net profit is €858,000. The proposal is to have an integrated production approach with contracted farmers through cooperations and production unions.

Investments in biodiesel depend on the oil price, but also interest in clean technology including global warming and energy security. In the near future investments might be expected to be low due to the sudden (global) difficulty of borrowing money which continues in 2009. In Turkey local prices are set by the government once a year. Effects of the world market on prices will therefore trigger down a bit later.

Biodiesel companies can buy raw materials at the market. However often they have agreements with input suppliers regarding the production of rapeseed or safflower. For example DB tarimsal enerji undertakes contracted rapeseed and safflower cultivation in various regions in a total area that amounts to more than 7,500ha. Also with the support and guidance of the state, contracted farming is carried out for oilseed varieties that have not been common in the country but have high agricultural output potentials and generate good revenue as industrial agriculture products. Oil mills often also deal with contract farming.

Biodiesel is currently not profitable due to its higher price than regular diesel. For example 3 kg of sunflower necessary for 1 litre of biodiesel is already more expensive than the price of biodiesel itself. The prices for raw agricultural crops are increasing much faster than the prices of diesel. Insurances for rapeseed production, a potentially promising biodiesel crop, do not exist in Turkey (Kleindorfer and Öktem, 2007).

Used oil as input for biodiesel

Albiyobir has initiated a new project concentrating on the collection and reuse of used oils. In Turkey 1.5MT of oil is used for cooking. Of this figure 20% has a potential to be used for biodiesel. The target of the project is to include 62 cities and 2 other companies who already have a license for collection of used oils. Currently a total of 3,225 municipalities in different cities are collaborating. The biodiesel is produced locally from the collected oil. The collected amount was 2,000t in 2007 and is targeted at 10,000t in 2008 of which 80% can be converted into biodiesel. Mid-2008, 5,000-6,000t were collected from the households. Nor the collecting company neither the households need to pay for the used oil. However, the collecting companies depend on people's perception on saving the environment and thereby saving the used oil for their collection. A small local Turkish petrol company with whom Albiyobir has good relationships is buying the biodiesel. Support is received from the Ministry of environment through information and authorisation.

Biodiesel trade

The market for biodiesel in Turkey could be based on the amount of gasoline used in transportation. In 2006, 3.3m. MT gasoline is used for transportation (AIS, 2007). AIS mentions that in 2006, 65,000MT ethanol was sold. This is equal to the non-mandatory blending possibility of 2% of the 3.3m. MT gasoline consumed for transport. As the amount of ethanol or biodiesel mixed in gasoline is non-mandatory and as long as biodiesel is more expensive than gasoline it is not likely that biodiesel market in Turkey will increase.

Export is locally seen as one of the options for continuity until the biodiesel sector picks up in Turkey. Currently the export prices are higher than local prices. Some of the producers already had export agreements with European countries for their biodiesel. Biodiesel from rapeseed has been exported to Spain in the recent past. Major plans have been developed to export biodiesel to Europe by Çevresel Kimya (Turkish Daily News, 28 July, 2008) at a time when biodiesel production was almost completely halted. ÇEVKIM is a large company with contracts for production of raw material. Its plan is to start immediate export of biodiesel to Spain and Romania at a value of €48m. per year.

The main drivers for bio energy production in the EU are sustainability, security of energy supply and employment (EC, 2008b; JRC, 2008). Local production of feedstocks is limited and free trade policies are traditionally favoured. This has contributed to large import volumes of biomass for local energy production. The Netherlands sees itself and the harbour of Rotterdam in particular as the main port for biomass into Europe.

MVO (2006) reported that as a result of the biodiesel demand the EU would need 3.8 to 4.5m. t of vegetable oil for filling the biodiesel demand in 2010. Due to quality demands rape seed oil is the most important feedstock for biodiesel. Other oils can also be used in mixtures and by using additives. The EU biodiesel production grew from 4.9m. t in 2006 to 5.7m. t in 2007 (EBB, 2008). Germany is the largest producer with a production of 2.9m. t biodiesel in 2007. Biodiesel production capacity though is much higher. According to the European Biodiesel Board (2008) the EU biodiesel production capacity was 10,3m. t in 2007 and will be16m. t in 2008. A slowing of biodiesel production and overcapacity is due to controversial biodiesel imports from the US and due to the high cost of vegetable oil on the world market in mid 2008. In the Netherlands the biodiesel production capacity expanded from 115.000t in 2007 to 571.000t in 2008 (EBB, 2008). MVO (2007) expects 2.5m. t of biodiesel production capacity by 2009.

3.3 Sustainability

EU drivers of biofuel are to be less dependent on oil import and improve the sustainability issues. Sustainability is becoming a very important issue in the discussion on biofuels in the EU. Especially the green house gas (GHG) balance and the competition of agricultural inputs for food, feed and fuel resulting in higher food prices has become an issue. Sustainability in EU policy documents refers mainly to reduction of GHG emissions. Still, in recent years the sustainability of certain biomass types used for large scale electricity production (palm oil for combustion) is being doubted because of the associated rainforest destruction (and resulting GHG emissions and biodiversity loss). Biofuels (for transport) have also been criticised for having GHG emissions which are

sometimes higher than those of fossil fuels they intend to replace. Since a lowering of GHG emissions is a key aim of using biofuels in the EU and especially in The Netherlands, this issue will have to be solved.

As a result of these concerns The Netherlands was one of the first countries to develop sustainability criteria for bio energy. In the UK, Germany and at EU level these criteria are also being developed. These sustainability criteria aim at assuring minimal GHG efficiency compared to fossil fuel production and avoiding negative effects on food production, biodiversity, soils and other aspects.

In Turkey sustainability in the sense of GHG balance is not a topic. The Ministry of energy expects that sustainability and renewable energy will gain importance when signing the Kyoto protocol. Turkey's government has agreed early June 2008 to sign the Kyoto protocol due to European Union pressure to improve environmental standards. The government sent a bill for ratification to the parliament for approval. The bill was discussed at the parliamentary commissions on environment, EU harmonisation and foreign affairs. Parliament ended its current term after passing seven bills in its final session, but it did not pass the bill for ratification of signing Kyoto protocol (Sundays Zaman, August 17, 2008).

Turkey wants to enhance its diversity of their energy resources to reduce its dependency on imports. Turkey has potential to provide more energy security by using biomass.

In the last few years world agricultural prices are increasing. These prices are currently still relatively low compared to the high (real) prices in the mid-70s (Banse et al., 2008). Critics of using agricultural crops for biofuel often relate the higher agricultural prices to the increase in biofuel production. This is however only a part of the explanation of high food prices and probably only explains a little part. Prices are determined by supply and demand. Recent supply of grains on a global level didn't change much. Barley and wheat harvests were low but compensated by bumper harvests of corn worldwide. Higher energy prices lead to higher food prices as costs increase. The Common Agricultural Policy has limited the supply in many cases. Demand for food is growing due to the increasing world population but more and more due to continued economic growth (change in diet). Demand for agricultural products also increased because of demand for biofuels, but only marginally, as 5% of global oilseed production and 4.5% of global cereal production are used to produce biofuel. Secondly, ethanol has been produced in Brazil for a long time. Finally the increasing food and feedstock prices make biofuels less profitable and food more profitable (Banse et al., 2008).

3.4 SWOT of biodiesel production in Turkey

Strengths

1. Land is available

Turkey has rich natural resources and a high agricultural potential. Although land is getting more fragmented, land is available especially through several projects which are stimulating agricultural land use, such as the GAP.

2. Entrepreneurial people

The Turkish people are entrepreneurial and respond quickly to changing market demands.

3. Available infrastructure

Infrastructure for the biodiesel sector is available. Particularly the capacity to produce biodiesel in current factories is satisfactory.

Weaknesses

1. Lack of local agricultural raw materials

Availability of locally produced oilseeds (like rapeseed and safflower) is in shortage. Local production is lacking and competing with the food industry.

2. Biodiesel quality
Previous consumer experiences of using biodiesel and bad publicity on quality issues are factors influencing consumers' perception on biofuel. In the beginning the biofuel quality was so poor that it damaged car engines.

Opportunities

1. Kyoto
Once the protocol is signed this might raise more attention towards biodiesel, even though its effects on reducing global warming are not uniformly shared.

2. Price guarantee for farmers or integrated chain
A price guarantee (by the biodiesel processors) would provide farmers some security and an incentive to produce oil crops for the biodiesel sector. An integrated chain can be helpful to ensure a constant supply of raw materials into the biodiesel chain.

3. Large demand
If policy is directed towards biodiesel (either because of sustainability reasons or a better trade balance), Turkey offers a large market for biodiesel.

Threats

1. *Small scale production*
The production for biodiesel is very local and the sector consists mainly of small scale activities. Consolidation of biodiesel production is necessary in order to provide the quality and amount demanded by fuel distribution companies.

2. *Focus in policy on biodiesel is unclear*
Current policy does not stimulate production of local oilseed crops for biodiesel production. Biodiesel is not mandatory, resulting in a low demand, certainly when petro oil prices are lower. The licensing of starting biodiesel companies is also not stimulating as the procedure takes very long and requires a running plant.

3. *Oil prices*
The oil price is crucial for the development of biofuels. High oil prices will stimulate biodiesel production. How the oil prices will develop in the future is to be seen.

4 Analysis of Dutch opportunities in the Turkish biodiesel sector

Possibilities for the Dutch private sector to be involved in the Turkish biodiesel sector are currently very limited. The biodiesel sector in Turkey has reduced to a minimum due to lack of local agricultural raw materials to produce biodiesel and lack of political stimuli to produce biodiesel.

Local demand for biodiesel is limited. Demand can increase if policy will have a clear focus on biofuel. Policy examples which will provide more scope for biofuel is for example to have oil alternatives or to follow the EU mandatory mixing of fuel with biofuel.

Due to scarcity of raw materials, trading biodiesel with Turkey for the EU is also not a current option. Exporting biodiesel from Turkey might be an option in the longer term as processing and labour in Turkey is more competitive than in most countries of the EU.

Currently the capacity in Turkey to produce biodiesel is sufficient, due to the constructed biodiesel factories. The role of the Dutch private sector in the future is not likely to be in starting a new biodiesel production facility. If the Turkish biodiesel sector will develop in the future, cooperation with the Dutch might be more in terms of technical support to improve the production capacity and quality and introduce innovative technologies. Know how and information on the second generation biofuels is wanted. Need for this technical support was highlighted by both the private and the public sector.

A second field of cooperation can be in organising efficient supply chains. Policy makers and biodiesel producers referred to a better chain integration which stabilises prices a bit more within the chain. Cooperation in reaching more efficient supply chains can also take place by improving the organisation of the current scattered and small scale production and by assisting sales and exports through provision of marketing information.

As Turkey has decided to sign the Kyoto protocol it might also be interesting for Dutch entrepreneurs to provide support on activities in carbon credits. Currently there are no carbon credit companies in Turkey available. Practical guidelines for foreign investments in Turkey can be found in the recently published Investment Guide of Turkey by the Austria Bank (see: *http://www.bankaustria.at* /informationspdfs/InvestmentGuide-Turkey.pdf).

5 Conclusions and recommendations

In Turkey agriculture has still a substantial share in the GDP. Agriculture, driven by cereal, fruit and vegetable production is responsible for 9% of Turkish GDP in 2007 and 27% of the total labour force. However, the productivity is relatively low due to out of date technologies, land fragmentation, poor road infrastructure and fallow land.

In 2001 Turkey went through a severe financial crisis as the exchange rate system collapsed and banks and financial institutions went bankrupt. Structural reforms were implemented, banks were seized by the government and an independent regulatory framework supervised by the Banking Regulation and Supervision Agency was set up. The reforms were partly aimed at risk management of liquidity, assets and liability management. The economic situation did improve after 2001, joined by an increase in foreign investments. The actions taken as a result to face the financial crisis of 2001 might still be effective to deal with the global financial crisis of 2008. Currently export is decreasing, but full impacts remain to be seen.

Turkey is a member of the WTO and is in discussion to become an EU member. The country is currently trading mostly with Russia, Germany, China and very little with The Netherlands. The improved law on Foreign Direct Investment (FDI) did improve Turkish business climate and did attract more FDI.

Turkey imports 80% of its total energy needs and practically all needed oil and gas. The country is also a net importer of oilseeds and animal and vegetable oils. Rapeseed production has increased rapidly, and safflower production is increasing more slowly since 2002.

The key drivers for biodiesel are the same as for Turkish other energy sources. Biodiesel contributes to a security of energy supply as it adds to a more diversified mix of sources, addresses the climate change, and is expected to be cost efficient if carbon taxes are implemented.

Biodiesel production started in Turkey in 2000. In the following years quite some biodiesel production capacity was being constructed. It has never been fully used and in 2008 biodiesel production was stopped completely. Biodiesel was not commercially possible due to lack of agricultural input. Enough land is available to grow the suitable crops, but land is in competition with crops for the food industry. Safflower and rapeseed, both well suited for biodiesel production, are uncommon crops to be produced in Turkey. Furthermore biodiesel is lacking demand. In Turkey there is no policy towards biodiesel as in the EU and can not compete with the regular fuel. Export of raw material is not interesting as long as local food prices are higher and oil prices lower.

The biodiesel production capacity is present but more incentives are needed to facilitate the production, such as mandatory mixing of biodiesel in higher amounts and improved tax advantages. The private sector has started to lobby for biodiesel to be organised under the Renewable Energy Law in which consumption tax is not included and for a higher tax free amount of biofuel to be mixed with regular fuel.

An integrated approach and large volume production may help in reducing costs and producing a constant quality. Dutch companies can assist by providing technical support in improving the production capacity and quality and providing knowledge on improving the organisation of a more efficient supply chain to reach a large production volume and stable prices.

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Appendix 1

Unstructured questionnaire for analysis of biodiesel market in Turkey

The aim of this questionnaire is to acquire information for:
- Characterization of the Turkish biodiesel sector from a commercial perspective;
- Identification of opportunities and threats for investments and collaborations in the biodiesel sector in Turkey.

Policies:
- What is the opinion of the policy makers on biodiesel production?
- Which bioenergy policies does Turkey have?
- Are there any bioenergy/biodiesel targets?
- Does Turkey follow bioenergy/biodiesel targets of the EU?
- Are there any set deadlines and objectives for production capacity or use of biodiesel?
- What are the specific drivers for biodiesel production in Turkey? (security of supply, agricultural support, sustainability, ghg lowering)
- What is the importance of biodiesel for the Turkish agricultural development?
- Who are the main players on policy making, production, research?
- Which government bodies are mainly involved in developments of strategies for renewable energy?
- What are the issues on sustainability of biofuels/biodiesel? Is there any discussion?
- Are there any standards and control systems being enforced?
- What entails the biodiesel norm TSEN 14214?
- What are the laws that are enforced in use, import and export of biodiesel?
- Is there any form of support (e.g. tax reduction, subsidies) for producing or using biodiesel?

Raw material production:
- What are the current applied raw materials for producing biodiesel?
- What problems exist with the production of the raw material?
- What needs to be done to increase the local production of the raw material?

Biodiesel production:
- What is the current estimated biodiesel production capacity?
- What is the forecast in biodiesel production capacity?
- Which are the key companies?
- What is the role of oil companies (distribution)?
- Are there integrated biodiesel systems/co-operatives?
- Why are the biodiesel factories mostly located in Gaziantep, Izmir and Kocaeli?
- What is the potential of collecting used oil (for example in the Istanbul municipality)?

Markets:
- What is the current market for biodiesel in Turkey?
- What is the market growth in the coming years?
- Is statistical data available on biodiesel produced, feedstocks (crops, oils, by-products), number of biodiesel plants, installed capacity now and planned, biodiesel imports/exports?

Future developments:
- Are there new projects being developed? If so what are these initiatives?
- Are these activities in anyway organised/linked?
- What is expected to change in the future?
- What research organisations are involved? What is their role?
- Are there any research/development done on second generation biofuels? BTL/Fischer Tropsch?

Needs/opportunities:
- What kind of support would Turkey (agriculture, producers, ministries, distributers, consumers) need in developing the biodiesel sector?
- What could Turkey offer? Is export of biodiesel possible?
- What is the most important strength of the Turkish biodiesel sector and what is the most important weakness?

Other:
- What key documents are recommended (in Turkish as well)?
- What contacts are there with foreign investors, research, or other organisations?

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