Biogas Tønder

Environmental Impact Assessment
English translation of non-technical EIA summary

May 2013

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1 NON-TECHNICAL SUMMARY

1.1 Background

The company ENVO Group A/S is a Danish company with a focus on renewable energy systems. ENVO Group has established the company ENVO Biogas Tønder A/S together with an Argentinian investor. Biogas is a growing market in Denmark and ENVO has worked with and developed several profitable projects for several years in Denmark, of which ENVO Biogas Tønder is the largest to date. Construction is scheduled to start by the end of 2013 and operation in early 2015.

Biogas Tønder is planned to be located at Solvig in Tønder Municipality as shown in Figure 3.1. The plot is 12 hectares and is situated some 7 km to the east-northeast of Tønder Town, immediately south of the road Åbenråvej at Solvig on the road Midtmosevej.

Today the area is used for agriculture. To the north, the area borders on agricultural land, along the eastern boundary, the brook Solderup-Nørrekjær Bæk is located, and to the south and west forest areas.

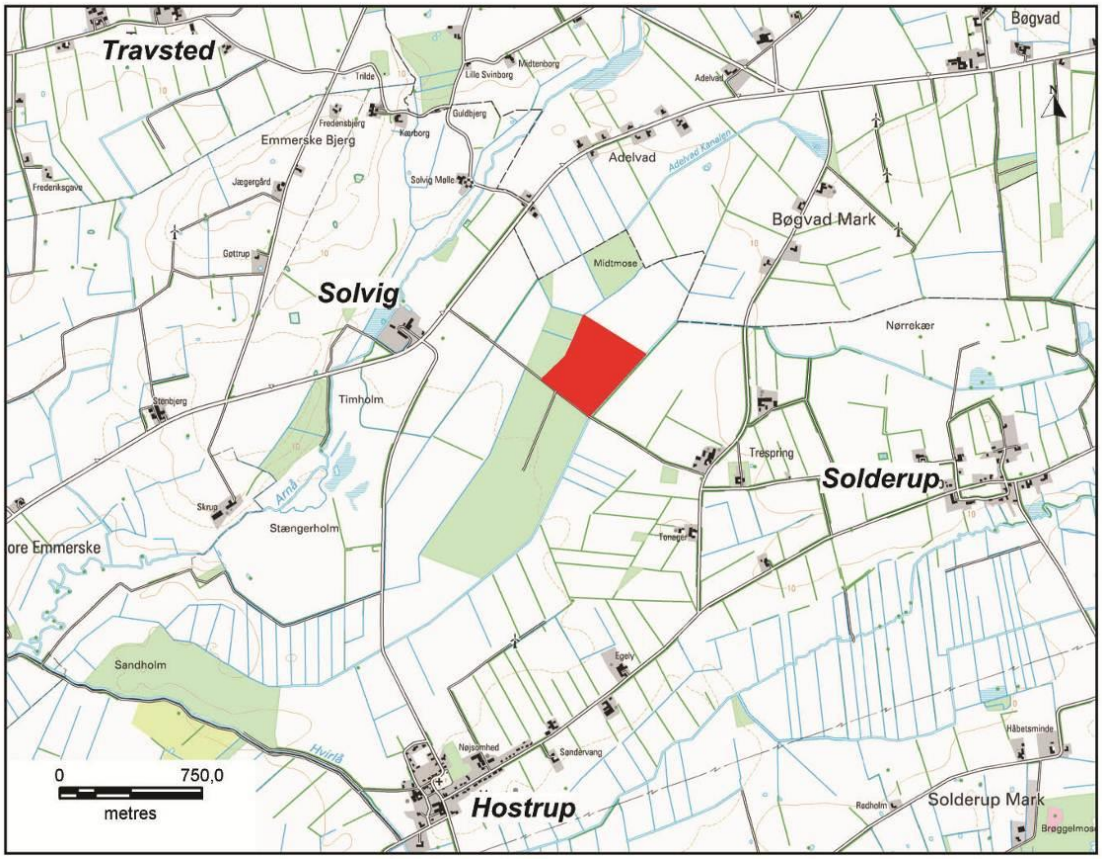

Figure 1.1 Overview map over the project site. The location of Biogas Tønder is marked in red.

1.2 Description of the planned project

A biogas plant is a plant which converts biomass into valuable fertilizers and environmentally friendly biogas by means of bacteria. The biomass can consist of for instance livestock manure, energy crops and organic residual products, such as food industry waste.

The main principle of the operation of a biogas plant is that the plant ”borrows” livestock manure from farmers, uses it for production of biogas and then returns it to farmers again. The returned product (degassed material) has an improved value as fertilizer. The biogas produced by the plant is upgraded to a gas (“bio-natur gas”) similar to natural gas which is distributed via the grid for natural gas for various purposes (factories, district heating, heating of homes and, in the long term, also transportation).

Seven local storage facilities in the supply area of Biogas Tønder will store degassed material before it is collected by the farmers. The storages will also include maize, beet and grass silage prior to use in the production of biogas.

Physically, a biogas plant consists of a series of processes, sub-plants, tanks, stacks etc. All raw materials that are introduced into the plant by tanker trucks are received and handled in a large reception hall before being transported to interim storage tanks and digesters. At the entrance and exit of the reception hall, all trucks drive through an “odour lock” to minimise odour emissions to the surroundings.

In order to optimise the plant’s biogas output, the biomass is digested in two steps: a primary digestion and a secondary post-digestion. In order to further optimise the gas production, fibres from the biomass are recirculated to the digesters. After digestion, the degassed biomass is pumped to storage tanks for temporary storage before it is returned to the manure suppliers or the local storage facilities in the supply area.

With a view to avoid the risk of spreading infections from one farm to another, Biogas Tønder will be provided with a sanitisation unit where the degassed materials will be heated to 70 degrees Celsius for an hour.

The post-digestion tanks and storage tanks will also serve as gas storage facilities. That is, the tanks will be covered with double membranes so that they serve as low pressure gas storage tanks as well.

The biogas is upgraded and compressed before being fed into the natural gas grid.

1.3 Resource consumption and waste in connection with the construction and operation of Biogas Tønder

During the construction phase, substantial amounts of raw materials and materials will be required. Particularly, there will be a need for concrete for the tank and building foundations and for the buildings as well as steel for the tanks and tank facilities. Moreover, asphalt and compacting materials for parking spaces and roads.

As Biogas Tønder will be established on agricultural soil without demolition of existing plants and buildings, no significant amounts of waste will be generated during the construction phase apart from the normal types and quantities of waste generated by this type of construction projects.

During construction, excavated soil will be reused as far as possible by the project so as to minimise transport of soil.

To the extent possible, concrete, asphalt and compacting materials will be collected from local gravel pits, concrete and asphalt plants etc. It is assessed that there are abundant resources within short transport distance.

Nor is the use of other materials, particularly steel for tanks, assessed to pose a problem in terms of resources.

During operation, Biogas Tønder will in principle be self-sufficient with energy and heating. The plant's net energy consumption constitutes some 5% of the plant's total energy production.

Storm water will be collected from flat roofs and used for washing trucks and cleaning in general.

A truck washing plant will be established with biological cleaning and recirculation so that the net consumption of water is significantly reduced.

Waste will be sorted and disposed of in accordance with the Municipality's waste regulations.

The project will generally focus on minimising resource consumption and environmental impacts, amongst others through minimising transport of raw materials both during construction and operation of the plant.

Resources and waste are regulated by a series of laws and statutory orders, including the Danish Environmental Protection Act, the Statutory Order on Waste, the Soil Contamination Act, the Statutory Order on Soil Removal, the Raw Materials Act etc.

1.4 Environmental investigations

A long series of investigations have been conducted of the existing conditions in the area and the impact on these as a consequence of the establishment and operation of the biogas plant. Wherever considered necessary, remediation measures have been described with a view to minimising project impacts.

Impacts for both the construction and operation phases have been described. The construction phase includes the period of establishing the biogas plant and the local storage facilities as well as preparatory works at the suppliers. The construction phase is expected to start by the end of 2013, when the preliminary works are initiated and will be completed by the end of 2014. The operating phase is starting when the plant is commissioned. This is scheduled for the turn of the year 2014-15. In connection with the operating phase there will be a running-in period of up to six months before the plant is fully operational. This period will be characterised by particular conditions.

1.5 Landscape and visual aspects

Biogas Tønder will be established in an area designated as worthy of preservation. In such an area landscape considerations should have priority. Biogas Tønder can, to a wide extent, be "concealed" by the existing forests and hedgerows. Consequently, the plant will not stand out significantly from the existing large farms in the area. In order to further

minimise the visual impact, the district plan for the area includes provisions on concealing planting in the form of a 10 m wide and 16 m high plant belt around the plant.

1.6 Geology

The glacial sediments in the investigated area consist of varying layers of moraine clay and melting water sand. Layer thickness varies within the area and is assessed to be 10-60m. Beneath the glacial sediments argillaceous and sandy sediments are found.

The geological landscape is dominated by the plain, Tinglev-Hedeslette. In the most north-western and south-eastern corners of the area, the hill islands Abild Bakkeø and Jejsing Bakkeø are located close to the boundaries of the area.

During the operating phase there will be no impact in relation to the area's geology.

Geological areas of interest
Geological areas of interest are vulnerable to visual changes that can remove or conceal the original shape of the landscape. In these areas there are restrictions on buildings and plants etc.

In the area around Biogas Tønder there is a hill island of national geological interest, Jejsing Bakkeø (NGI 109). The area has been designated because the hill island's glacial sediments from the penultimate glacial age rise above the surrounding expanse of heather plain sediments from the last glacial age. These geological landscape forms must not be destroyed or concealed just as the unobstructed view from the hill Jejsing Bjerg is considered of special value. Moreover, there are local geological interests, ref. Tønder Municipality's local development plan, along the watercourse of Arnå which passes the biogas plant to the northwest at a distance of 850m.

The construction of Biogas Tønder is not assessed to be in conflict with the geological areas of interest.

Soil conditions
The soil in the area surrounding Biogas Tønder is generally made up of sandy late glacial and post glacial freshwater deposits/strata. According to the soil type map, there are no major coherent areas with too soft sediments. Post-glacial sand normally has a good bearing capacity, but if there are local deposits of peat, clay or (organic) silt, this may result in a reduced bearing capacity.

During construction, the replacement of any settlement producing strata in the form of soft ground sediments (peat, silt) with insufficient bearing strength may cause impacts - ochre precipitation. The prevalence of the sediments should be investigated prior to initiation of construction.
During the operating phase there will be no impacts in relation to soil conditions.

Groundwater conditions
The groundwater aquifer in the area around Biogas Tønder is made up of a major, coherent 15-35 m thick sand layer. The deep-lying sand layers are used for abstraction of drinking water.

The surface of the primary groundwater aquifer is found at ground level and thus, there is no covering layer to protect against seepage from the surface. This is the case for the entire site of Biogas Tønder. The area is characterised by numerous drainage channels which indicate that the groundwater level is high and that drainage of the soil layers close to the surface is necessary in order to cultivate the land.

It may become necessary to lower the groundwater level, if excavations go deeper than 1m below ground level. The extent of the groundwater lowering is assessed to be limited and a lowered groundwater level is not assessed to entail problematic impacts on the surroundings. The discharge of water pumped up as a result of a groundwater lowering may lead to precipitation of ochre. Groundwater should be discharged to minor ditches so as to limit precipitation of ochre.

During the operational phase there is a risk that the groundwater quality will be impacted by seepage and spills. Seepage is only used for drainage of surface water from roofs and minor paved areas that do not have a negative impact on groundwater. It is assessed that paving or a water-tight membrane will provide the best solution in relation to groundwater both at Biogas Tønder as well the local storage facilities. All handling and processing of materials at the plant will take place in closed tank facilities. Hence, the daily operation of the plant is not assessed to pose a threat to the groundwater.

Drinking water interests and catchment areas
The area northwest of Biogas Tønder is classified as an “area with special drinking water interests”. The planned site of the biogas plant is situated within an “area with drinking water interests”.

Northwest of the “area with special drinking water interests” (OSD), there is an area which is designated as a “nitrate-sensitive abstraction area” (NFI). This area is particularly vulnerable to percolation of contaminated components from the surface. The biogas plant is far away from this area.

Inside areas with special drinking water interests, great attention must be paid to protect against percolation of contaminants by following general guidelines. If these guidelines are complied with, the pollution risk of the new biogas plant and the local storage facilities is comparable to the risk of pollution from the existing manure tanks.

Waterworks and abstraction boreholes
There are no public water abstraction areas within a radius of more than 2km from the biogas plant. There are no waterworks boreholes or protection zones in the area where Biogas Tønder is planned to be established.

The area at Biogas Tønder will receive drinking water from Rørkær-Jersing Waterworks. For water that does not require drinking water quality, Biogas Tønder can apply for permission to establish its own borehole.

Groundwater vulnerability
The thickness of clay layers at ground level of the primary groundwater aquifer is an indicator of the natural protection of the groundwater. The major part of the area around Biogas Tønder, including the planned site of the biogas plant, has a small clay thickness at ground level of < 5 m. At the site there is hydraulic contact between the ground surface and the primary groundwater aquifer. The soil layers close to the surface are characterised by sandy sediments with a good run-off capacity. Thus, it is a vulnerable area.

1.7 Nature – Flora and fauna

Natura 2000 areas
Natura 2000 is a network of international nature protection areas, designated with a view to protecting certain nature types and species of animals and plants. In the area adjacent to the biogas plant, to the east, Habitat Area H90 is situated, including River Vidå with its contributors, Lake Rudbøl Sø and Magisterkogen (approx. 900 m), which are part of Natura 2000 Area no. 89, the Wadden Sea.

In the area surrounding the project site, the habitat and bird protection area "Kongens Mose and Draved Skov" is located. In addition, there are two bird protection areas (F60 - Vidåen, Tøndermarsken and Lake Saltvandsøen, which are also Ramsar areas as well as F63 - Sønder Ådal). The background for designation of the Natura 2000 Area Kongens Mose (marsh area) and the forest Draved Skov as well as the two bird protection areas will not be affected by the project, among others because of the distance to the plant.

Species in the designation basis
There are five designated animal species and two nature types in Habitat Area H90, that is otters and four fish species "bæklampret" (brook lamprey), "flodlampret" (river lamprey), "snæbel" (houting) and "dyndsmerling" (pond loach). The two nature types are related to lakes and watercourses.

Traces of otter have been found and it is considered highly likely that there are otters in the stretches of River Arnå located east of the biogas plant.

The "snæbel" (houting*)* is a high priority fish species which is unconditionally preserved and requires strict protection. It is known from the lower parts of the Vidå river system. River Arnå is a potential breeding territory and it is considered likely that the houting lives in the stretches of the watercourse that are located to the east of the biogas plant.

Brook lamprey
The "bæklampret" (brook lamprey*)* is known from stretches of the Vidå River system, amongst others at Emmerske, Tønder Gest Kog, Bylderup Bov, Rens and Eggebæk. The "Dyndsmerling" (pond loach) is known from the watercourse system Vidåen. The "Flodlampret" (river lamprey*)* has not been found during the field investigations of River Vidå. Nonetheless, it is considered likely that it exists in a few places.

The watercourses and consequently the brook lamprey, river lamprey, houting and pond loach will not be affected by Biogas Tønder.

Nature types
The habitat nature type 3260 – Watercourses with aquatic plants as mentioned in the designation basis for Habitat Area H90 is found in the stretch of Arnå River that crosses the north-western corner of the project area. Habitat nature type 3150 – Eutrophic lakes and ponds with floating leaf plants or large pondweed – is not found in the investigation area.
River Arnå will not be affected by Biogas Tønder and consequently habitat nature type 3260 – Watercourses with aquatic plants, will not be affected either.

Localities with protected nature
The Danish Nature Protection Act mandates protection of certain nature types to safeguard against negative changes to the natural condition of the areas in question.

At the planned location of Biogas Tønder, two adjacent areas to the west and northwest are registered as protected marsh which is overgrown and characterised as natural forest. The areas do not qualify for status as protected marsh according to section 3 of the Danish Nature Protection Act. Both marshes are also registered as forest reserves.

Dispersed within a radius of 4 km from the Biogas Tønder project area, there are many (>50) small ponds. These ponds are protected by the Danish Nature Protection Act. It is assessed that there may be amphibians in many of the ponds that are covered by Annex IV of the Habitat Directive.

Within the project area there are several protected watercourses. The two most significant are Rivers Arnå and Hvirlå. Along River Hvirlå a small edge of meadow is registered, which is protected according to paragraph 3 of the Danish Nature Protection Act. Along River Arnå several areas are also registered according to paragraph 3 as meadows and marshes. Apart from these areas six minor marsh areas are registered and one meadow area within the project area.

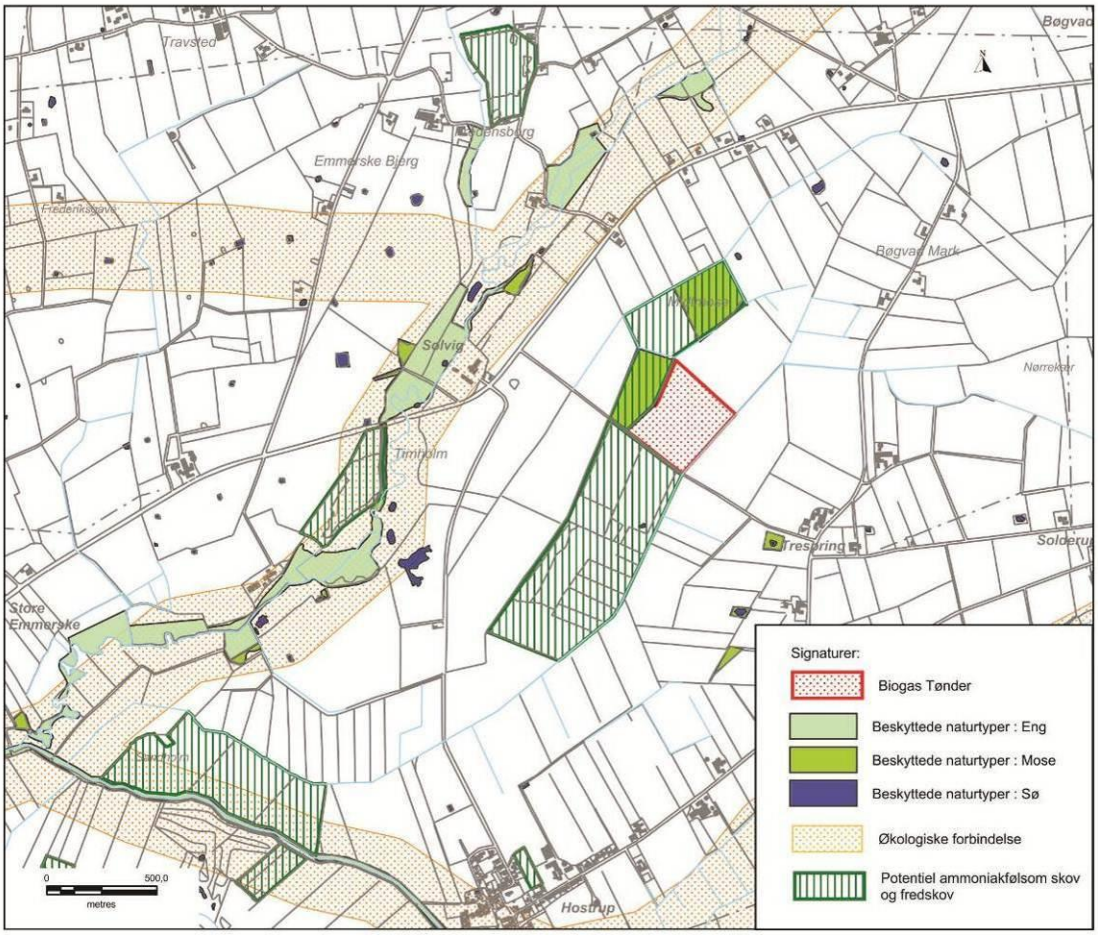

Figure 1.2 Location of protected nature types according to section 3 of the Danish Nature Protection Act as well as potential ammonia sensitive forests and ecological corridors.

Impacts

There is no protected nature on the biogas plant site and thus the establishment of Biogas Tønder does not entail any direct intervention into protected nature.

Calculations have been made of the impact of emissions of sulphur and nitrogen from the plant on the adjacent nature areas. Based on the calculations it is assessed that the establishment and operation of the biogas plant will not cause changes to the condition of protected nature in the adjacent area through an impact from sulphur or nitrogen or an accumulated impact of the two substances. Within the area where the deposition will occur there are no protected nature types that are sensitive to increased sulphur and nitrogen deposition.

Forest reserves, afforestation areas and potential ammonia-sensitive forests
There are several forest reserves in the immediate vicinity of the project area. The largest coherent forest area is partly situated along the planned site of the biogas plant. The forest areas are not assessed to be sensitive to sulphur.

The planned site of Biogas Tønder is designated as afforestation area in the local development plan for Tønder. There are no restrictions on the areas as a consequence of the designation. The major part of the biogas site is covered by a forest protection line, where it will be necessary to request for exemption from the Nature Protection Act.

Annex IV species
The term “Annex IV species” is derived from Annex IV of the Habitats Directive: “Animal and plant species of Community interest that require strict protection”. The protection applies to both the individual and the breeding and resting sites of the species in question. Of relevance for the project area are bats, amphibians, lizards and insects.

Bats
Five species of bats are known at or in the vicinity of the project area. These species are in Danish ”vand-flagermus” (water-bat), ”brun flagermus” (brown bat), ”syd-flagermus” (south-bat), ”trold-flagermus” (troll)- og pipistrel bats. There are no suited breeding and resting sites for bats in the area. Bats are likely to occur sporadically either passing through the area or looking for food along existing hedgerows and windbreaks and edges of forests.

Amphibians
A large part of the Danish Amphibians are Annex IV species. The species ”spidssnudet frø” (moor frog), ”stor vandsalamander” (great crested newt) and ”løgfrø” (Spade foot) are relevant in relation to the Biogas Tønder project. The “spidssnudet frø” (moor frog) is highly likely to exist in the ponds near the project area. There is some probability of a small population of “Løgfrø” (Spade foot) south of Jejsing (4 km from the project area).

Lizards
No lizards have been found within the project area nor are there any obvious localities for them.

Insects
No insects in the project area are assessed to be covered by Annex IV of the Habitats Directive.

Bats and amphibians are the Annex IV species that can be expected to be found in the project area. No ponds or woods will be abolished and it is assessed that the ecological functionality for amphibians and bats can be maintained. Consequently there is no need for remediation measures.

Other natural conditions in the area
Birds
There is knowledge of breeding "Hedehøg" (Mantagu's harrier) hawk 2 km from the location for the biogas plant, and it is likely that "sløruglen" (Barn Owl) is breeding in the vicinity. Apart from that, it is expected that common species of raptures are present in the area and breeding there.

Other protected species ("Rødlistede arter")
The closest known occurrence of the protected orchid species are found in the northern part of Tønder town and at Draved There are no protected species on the planed biogas site itself.

Ecological corridors
Ecological corridors connect existing habitats and allow passage or expansion for animals and plant communities. There are dedicated ecological corridors along Hvirlå and Arnå. If an ecological corridor is intercepted, fauna passages have to be established in order to minimize the impact on the connectivity between the areas. Biogas Tønder does not intercept any existing ecological corridors.

1.8 Surface water

The point of departure has been the existing water management plan. The water management plan is expected to be in force at the time of the public hearing of the present EIS report – possibly with minor adjustments.

Arnå (the Arn River is, from Bøgvad to the confluence with Hvirlå, a river with high protection goal for the ecological conditions. Similarly for Hvirlå upstream of Solderup Mark. The other stretches of the two rivers have targets of "good conditions" – the same as for the two small rivers joining. The many creeks and ditches do not have specific quality targets. The targets are fulfilled for Arnå and Hvirlå. For the two tributaries to Arnå the condition is moderate. Requirements for improvements have been set, but the time frame for the actions has been extended.

Arnå has been appointed as a Natura 2000-area (Habitat- area) all the way through the area. The appointment is closer described in the section: Nature, plant and animal life.

At the eastern boarder of the plot for the Tønder Biogas plant, there is a small water course called Solderup-Nørrekær Grøft. The water course discharges into Arnå. It is a public water course and protected according to paragraph 3 of the Environmental Protection Act. This means that the conditions cannot be allowed to deteriorate. At the western boarder of the plot another small unnamed water course has been identified. Both water courses are probably subject to the requirements for a "randzone (10 m buffer zone without agriculture).

The Municipal Development Plan (Kommuneplanen) includes requirements for improved treatment of wastewater from non-sewered plots in an area north of Solvig.

Storm water from roofs, other paved areas and minor roads and parking areas is discharged by dispersed seepage into biologically active soil.

Storm water from larger paved areas is to be discharged by seepage through French drains where possible or by discharge via a pond with plants, designed for equalisation and a certain treatment. Both seepage and discharge requires approval from the municipality according to the Environmental Protection Law. Since the discharge is equalised and treated or seeped into the soil, no impact is expected on the biological conditions in the streams.

During construction the water course should be protected against discharge og sand and soil etc.

1.9 Recreational conditions and outdoor activities

The area around the planed location of the Biogas Tønder is dominated by agricultural areas without natural specialities and minor villages and solitary houses.

The areas in the ecological corridor along Hvirlå and Arnå and the protected forests in the area have significant recreational values. Approximately 2 km from the biogas plant you find a regional path along the Hvirlå. The western part of the investigation area the Municipal Development Plan includes a proposal for a new regional path. Apart from this there are no areas or structures with significant recreational importance.

During the construction phase the necessary activities are likely to create temporary nuisances. Access via existing paths and roads may be impacted during shorter intervals. During the operational phase no significant impacts are expected on the recreational conditions and the possibilities for out-door activities.

1.10 Cultural issues

The cultural interests in the area are primarily attached to a series of archaeological discoveries from the stone-age in the river valley along Arnå and the protected buildings in Hostrup and Solvig as well as the castle mounds at Solvig. The mounds at Solvig imply a 100 m protection zone. The archaeological findings are all located in a narrow (3-400 m) corridor around Arnå and continue in an appointed cultural heritage site south of Store and Lille Emmerske.

Further there are many conservation worthy buildings in the area, and the area from Solvig and about 1.5 km further north along the river is appointed as an important cultural environment. Around Hostrup Church there is an appointed “Church landscape”, which stretches along Solvigvej and until just north of Solderup-Nørrekær Creek. A single larger protected stone and soil dike along Hvirlå south of Hostrup and through Sandholm has been registered.

Museum Sønderjylland, Archaeological department, in Haderslev is the responsible museum for the area and has undertaken a archival check of the area. The museum informs, that there are no registrations of fixed monuments of the past. There have previously been three large peat-mines. It should be possible to construct the proposed biogas plant without major risks of interfering with significant fixed monuments of the past, and important archaeological vales are not expected to be found in the area. If during the construction phase monuments of the pasts or other cultural/historical structures are nevertheless identified, the work should be stopped and the Museum Sønderjylland contacted.

1.11 Polluted soil

All of the investigation area for Biogas Tønder is lying in the agricultural and there are no mapped or known polluted sites (V2) or potentially polluted sites (V1). Likewise there are no classified areas within the scoped area.

The area where Biogas Tønder is planned to be located, has been used for agricultural land all the way back to1954, and it is assumed that this has also been the use even before 1954. On this background the soil in the area is judged to be pure agricultural soil. The soil can be handled without restrictions and without sampling as documentation towards the authorities. The recipient of possible surplus soil however can request documentation of the quality of the soil through sampling and analysing.

1.12 Traffic

The area appointed for establishment of Biogas Tønder lies at Solvig East of Tønder town. The biogas plant will be placed at Midtmosevej – a branch road to Åbenråvej.

The existing road network
It is expected that the transports to the biogas plant are within a distance of maximum 25 km. Biomass will be transported from the other side of the boarder of German.

The mapping of the existing traffic conditions has taken a starting point in the main roads (hovedlandevejene) and in Tønder Kommunes “traffic roads” (trafikveje), since these will be the preferred road network for transports to and from the biogas plant. Main roads comprise Route 8, 11 and 25 on the stretches respectively between Tønder and Tinglev, between the boarder to Germany and Døstrup and between Abild and Roost. Apart from this the municipal traffic roads include, respectively route 401, 419, 429, 435, 443 and 175/179. Further a single cross-cutting road is included; Dravedvej, which runs from Løgumkloster and south towards Åbenråvej. The road network is oriented towards the east compared to the biogas plant as this is the area where the major producers of manure are located and the majority of the transports are expected to flow on these roads.

The roads that are likely to be used for transport to the biogas plant are roads which are already today used by heavy vehicles and where passability (low risk of congestion) has a priority. For the evaluation of the impact of the increased traffic, the newest versions of the existing traffic pattern have been acquired from Tønder Kommune and an analysis of “dark spots” has been made from the occurrence of traffic accidents in the area.

Bicycle paths
Bicycle routes for school children are crossing the roads to be influenced in Tønder Kommune by the increased traffic, especially around Tønder and Løgumkloster. There is a dual directional bicycle path between Tønder and Route 11and north of Bredebro there

is also a dual directional bicycle path west of Route 11. Further there are dual directional bicycle paths between Døstrup and Skærbæk and along Route 8 north of the road between Tønder and Rørkær.

Public Transport
Passenger traffic with railroads in Tønder Kommune takes place on the rail road between Esbjerg and -Tønder, which on some connections is extended to Niebüll in Germany. Within Tønder Kommune the rail road serves the towns of Tønder, Bredebro and Skærbæk as well as four villages. Further there are five bus-routes in Tønder Kommune in the vicinity of the location at Midtmosevej.

Impacts of increased traffic
Establishment of the Biogas Tønder will lead to increased traffic on the roads around it. The impact of the traffic is dependent on the volume of raw materials to be treated on the biogas plant and on the location of the local storages and of the agricultural operations that sign up as suppliers for the biogas plant.

The main part of the lorry traffic is related to the delivery of fresh manure from the agricultural suppliers to the biogas plant and the return flow of degasified biomass to the farms. Further the transport of the degasified biomass to the local storages accounts for a significant new traffic load. Transport of energy crops by tractor to the local storages from the farms and distribution of surplus degasified biomass on farm land constitute almost the same number of vehicles. Further to the transport mentioned above there will also be extra traffic in private cars and busses to the biogas plant.

It should be noticed that part of the transport generated by the biogas plant exists already under the existing situation. For example manure, energy crops silage, sludge and organic industrial waste are already transported around in the area today – however within a different pattern and probably, in total, to a smaller degree.

The impacts from increased traffic to Biogas Tønder will be largest on the road network in the vicinity of Biogas Tønder – both in numbers and in fractions of the total traffic.

The increase in the annual mean daily traffic (ÅDT) is between 1 % and 4 %. For truck alone the increase is somewhat bigger, between 5 % and 43 %. The increase in the traffic load obviously will be biggest at the junction between Midtmosevej and Åbenråvej.

The expected traffic loads to and from the biogas plant can, in isolation, appear to be very large, and large attention has been directed towards this issue during the initial planning phases from both citizens and Tønder Kommune on the consequences of increased traffic.

Based on the expected amounts of manure, deep litter, maize, beet and grass silage, degasified biomass etc to and from the biogas plant, a traffic load of a maximum of 279 trucks per day (working day traffic, HDT) and on average 17 trucks per hour. The peak hour traffic to/from the biogas plant is set at 56 trucks per hour, corresponding to 20 %of the daily traffic.

New T-junction at Midtmosevej
The best passability (low risk of congestion) at Åbenråvej is achieved in the case where the junction is laid out as a prioritised (automatic traffic light) T- junction. Establishment of a round-about gives the best traffic safety. No problems are expected in terms of capacity whether the junction is made as a prioritised T-junction or with a round-about.

Barrier-effects and traffic safety
Changes in barrier effect will especially be felt at Åbenråvej and Adelvadvej.

Establishment of the biogas plant and the local storages will reduce the number of slow-moving tractors, since the transport of energy crops as far as possible will take place with truck or tanker. Reduction of tractor transport has both a positive effect on passablity and on traffic safety aspects.

Establishment of the access road to the biogas plant from Midtmosevej to Åbenråvej poses a traffic safety problem that must be solved, since the conditions for oversight from Midtmosevej towards the west are not satisfactory. At the same time the drivers at Åbenråvej from the east cannot recognise the junction sufficiently early.

Remedial measures
In connection with the establishment of the access road to the biogas plant on Midtmosevej, the crossroads at Åbenråvej should be made as a roundabout to improve traffic safety. The road users at Åbenråvej should also be warned by road signs and the establishment of a local speed restriction.

The design of the access road at Midtmosevej should take into consideration the expected traffic volume and transport types. Midtmosevej will also be closed immediately to the south of the biogas plant so that there will be no through traffic on Midtmosevej.

1.13 Noise

The consequences of the establishment of Biogas Tønder as to road noise near the houses affected along the local road network have been investigated. The consequences have been determined by calculations of road noise in the following two situations:

- Existing situation The existing situation as it is today
- Biogas Tønder After the establishment of Biogas Tønder

The transport of material to and from the biogas plant and the local storage facilities spreads over a relatively large road network. This means that the traffic increase for the internal transport is relatively moderate after a few road forks from the biogas plant.

Therefore, the investigation of the consequences for road noise has been limited to the primary road network around the biogas plant and is made as a noise map near houses along the sections in question. The consequences of the road noise near the local storage facilities will be dealt with individually.

The investigation contains a presentation of the results of the noise map and the expected consequences in terms of noise. The report also includes a brief introduction to limit values for road noise and a short description of method and assumptions for the noise map.

The results of the noise map are lists with the number of houses exposed to noise in the two situations. A house is considered exposed to noise when the noise level from road traffic exceeds 58 dB(A). If the noise level exceeds 68 dB(A), the house is considered heavily noise exposed.

It is assessed that there are 134 houses exposed to noise today along the road network in question. This number is expected to increase to 139 when the biogas plant is established.

The road noise at the local storage areas is only expected to increase marginally. In the storage area for local storage facility no. 2 where the largest relative increase in the noise level is expected an increase of 0.8 dB has been found.

The subject of vibrations from the road traffic in consequence of the establishment of Biogas Tønder is not dealt with further in this connection as the expected vehicles for internal transport of biomass distinguish themselves from the vehicles already served by the local roads.

1.14 Air and climate

A technical background report has been prepared: Smell and air pollution, determination of emission heights (annex 3).

1.15 Impacts from the plant

The house nearest to the plant is 400 m away, and experience has shown that there will be no dust nuisance from the operation of construction machinery during the construction phase. In case of considerable earthworks etc., dust nuisance may occur some days. It will, however, be possible to prevent such nuisance by appropriate planning of the work.

When the running-in of the processes at the plant starts, there may be operational situations that will have to be adjusted in order to prevent smell constituting a nuisance in the surroundings. During commissioning of the plant, focus will be on minimising operational situations that may cause non-controllable smell emissions. If gas is produced which due to technical problems cannot be stored or sold, the gas will be led to the flare at the plant. The flare will be designed so that the limit values for air pollution and smell in the surroundings are observed.

During operation of the plant, all emissions containing smell and air polluting substances will be led to ventilation or chimney to ensure sufficient dilution so that the limit values in the surroundings are observed. The emission heights will be designed in such a way that the limit values, with great certainty, can be observed.

The plant will be designed and constructed in such a way that all diffuse emissions will be reduced to such low values that they will be insignificant for the smell effect on the surroundings.

Calculations have been made showing that the deposition of sulphur and nitrogen in a distance of more than 800 metres from the plant is so low, that it is impossible to detect adverse effects on sensitive natural areas. A more thorough assessment of the environmental impacts of the depositions is given in the section Nature – Plant and animal life.

Remedial measures
The calculations and assessments made have shown that all recommended limit values can be observed.

All buildings and storage facilities including areas with smelling activities will be installed with controlled ventilation. All exhaust will be led to an effective smell purification plant and from this to a high chimney. In this way it is ensured that there will be no smell in the surroundings constituting a nuisance. The plant will be designed and requirements will be made to the suppliers so that the limit values of the Danish Environmental Protection Agency for air pollution and smell are observed.

1.16 Traffic impacts

As a consequence of the planned biogas plant at Midtmosevej in Tønder Municipality, the traffic volume will increase on the nearby roads. This will result in an increased emission of air polluting substances. In order to assess the increase in the air pollution level for houses close to the road sections in question, a calculation and an assessment have been made for a section of the road which is likely to experience the largest increase in heavy traffic.

During the construction phase, the primary impact will be caused by the use of construction machinery. The traffic on the road network will not be significantly changed as the machinery will only be active on the site in question.

A consequence of the establishment of the biogas plant will be an increase in heavy traffic in the area during the operation of Biogas Tønder. The largest increase in heavy traffic will be on Åbenraavej/Adelvadvej between Midtmosevej and Sottrupvej. It is assumed that the biogas plant will result in an increase in traffic of 100 heavy vehicles per day for this section of the road. The results of calculations of traffic contributions are given in technical annex to this EIA.

The general air pollution in the area can be considered low. The increased traffic volume as a consequence of the biogas plant will result in an increase in the NO_x concentration along the road. It has been calculated to be insignificant and in practice impossible to register.

Remedial measures
Remedial measures will not be necessary.

1.17 Climate impacts

The climate impact will be determined by comparing a situation without the biogas plant and a situation with the biogas plant in full operation. Without the biogas plant, the manure will be stored in tanks at the individual farms and spread on the fields. The household waste will partly be incinerated in incineration plants, partly be composted. With the biogas plant, manure, household waste and industrial waste will be used for biogas production. The gas produced will be upgraded and led to the natural gas network. Furthermore, a biological decomposition of the organic dry matter will take place.

The total climate impact measured in CO_2 from the biogas plant has been calculated to a reduction in the CO_2 emission of approx. 80,000 tons/year in 2019. This corresponds to an annual natural gas consumption of approx. 20,000 single-family houses.

The main differences between the two situations are reduced methane release from the manure storage tanks and replacement of fossil natural gas. Furthermore, there will be an increased CO_2 emission from the operation of the biogas plant and from the transport of biomass to and from the biogas plant.

1.18 Local storage facilities

Seven local storage facilities will partly store digested material until the farmers collect it, partly store maize, beet and grass silage until it is used in the biogas production. The local storage facilities will be located in the open country, close to the farms that will supply silage and take the digested material, in order to minimise the tractor traffic and to ensure local accessibility. Some of the storage facilities will store both digested material and silage, others only digested material.

The precise location of the seven storage facilities has not yet been determined; however, seven areas have initially been selected in which local storage facilities could be placed. These areas have been selected based on a number of considerations regarding planning and the environment. Areas with considerable restrictions and considerations have been dropped. The process of final selection of a location for each storage facility will take place through a dialogue with plot owners and identification of local environmental and cultural considerations.