REDcert

Supplementary system principles for **biomethane** for implementation of the BioKraft-NachV

10. July 2012

Introduction

To protect the climate and reduce current greenhouse gas emissions, the sustainable use of biomass for energy is to be encouraged. The 2009/28/EC Directive defines sustainability requirements for the use of biomass for energy. With the Biomass Electricity Sustainability Ordinance (BioSt-NachV) and the Biofuels Sustainability Ordinance (Biokraft-NachV), the framework of the Renewable Energy Sources directive stipulated by the European Union for sustainability criteria for biofuels and liquid fuels is transposed into national law (Germany). The specifications of the Sustainability Ordinances apply for companies along the entire production, processing and supply chain all the way to the plant operator and those responsible for providing proof that they satisfy the requirements pursuant to the Energy Taxation Act and the Federal Immissions Control Act (BlmSchG). All operations engaged in the production and supply of biomass in compliance with these regulations must have pledged to comply with an approved certification scheme. REDcert is this type of certification scheme.

1 Scope of application

The requirements stipulated in the Biofuels Sustainability Ordinance (Biokraft-NachV) apply to liquid and gaseous biofuels made from biomass. As a result, proof of compliance with the sustainability criteria must also be furnished for biogas processed to reach natural gas quality (biomethane) if it is to be used by the market participants to satisfy their biofuel quota requirement or for the purpose of tax relief.
This document provides an overview of the additional requirements for economic actors along the biomethane value chain. Requirements that have already been described in existing REDcert system principles are referenced; new or different criteria or criteria specific to biomethane are described in this document.

In the area of biomethane, a distinction is made among the following economic actors: farmers, first gathering points, biogas facilities (that can also simultaneously be first gathering points), biogas processing facilities and dealers (suppliers before and after the last interface). The system principles valid for these market participants in the REDcert system are not replaced but supplemented by these requirements.

2 Definitions

Compliance with the sustainability requirements is checked in the following phases:

- **Production of sustainable biomass** - here, the requirements for the sustainable production of biomass pursuant to the Biomass Electricity Sustainability Ordinance (Biokraft-NachV) apply to all farmers who supply sustainable biomass to first gathering points in the REDcert system (system participants).

- **First gathering points** are operations that accept the harvested biomass from the farm for the first time. In the area of biomethane, this is often the biogas facility where the biomass is used for fermentation, but it also includes any other economic actor who accepts the biomass from the farmer on his own account for the purpose of resale and then passes it on to the biogas facility.

- **Biogas facilities** that produce raw biogas are conversion facilities and thus interfaces as defined in the Biokraft-NachV.

- The last interface in the area of biomethane is the **biogas processing facility** that processes the biogas to reach the required quality level for use as biofuel until it is fed into the natural gas network.

- In the REDcert system, registered suppliers are **dealers** who operate between and after the interfaces above.

3 Requirements

3.1 Requirements for farms

The requirements for the production of sustainable biomass and the required documentation and verification are described in the REDcert document "System principles for the process step Agriculture for implementation of the Biomass Sustainability Ordinances".
Farms are subject to sample inspections. The inspection intervals and the scope of sample inspections are defined in the REDcert document "System principles for neutral inspections under the Biomass Sustainability Ordinances (BioSt-NachV and Biokraft-NachV)".

There are currently no default values for biogas produced from feedstock, e.g. biogas made from maize, grass, grain silage, etc. nor are there officially approved regional farming estimates (NUTS2 values) for these crops. As a result, the farm must record and pass on the values resulting from biomass cultivation to calculate the GHG emissions (if the first gathering point/biogas facility performs the GHG calculation) or it calculates the GHG emissions itself individually. The REDcert document "System principles for GHG calculation under the Biomass Sustainability Ordinances (BioSt-NachV and Biokraft-NachV)" identifies the data required and describes the methodology of GHG calculation.

3.2 Requirements for first gathering points

First gathering points are interfaces as defined in the Biokraft-NachV and thus require certification. The REDcert system requirements for first gathering points are described in the phase-specific system principles in their current version (see System principles for the process step first gathering point for implementation of the Biomass Sustainability Ordinances (BioSt-NachV and Biokraft-NachV).

The following additional requirements are specific to the area of biomethane:

In the event of silaging, the silage losses that occur during substrate storage must be documented and included in balancing.

It must also be kept in mind that the substrates supplied (biomass) have different GHG values. This also has to be included in the operations' internal balancing in the event that different substrates are mixed during storage - for more information, see the REDcert document "System principles for mass balancing under the Biomass Sustainability Ordinances (BioSt-NachV and Biokraft-NachV)" as well as the Communication from the Commission on voluntary schemes and default values in the EU biofuel and bioliquid sustainability scheme (2010/C 160/01[1]) from 19.06.2010 that governs the process of mass balancing if consignments with different sustainability characteristics are mixed or parts of this mixture are taken out.

3.3 Requirements for (last) interfaces

The (last) interface must be inspected and certified because a conversion takes place and the last interface (the processing facility) issues sustainability certificates for the fed-in quantity of biomethane.

[1] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2010:160:0001:0007:EN:PDF accessed on 11.05.2012

In the area of biomethane, the (last) interfaces generally must satisfy the requirements outlined in the REDcert document "System principles for the process step last interface for implementation of the Biomass Sustainability Ordinances (BioSt-NachV and Biokraft-NachV). Several specific requirements for the (last) interface in the area of biomethane are described below.

Because it is generally necessary to calculate the GHG emissions individually[2], the biogas facility, as described in the "Biomethan als Kraftstoff" (Biomethane as fuel) recommendation by Fehrenbach et. al. (2010)[3] must have a dosage unit with a weighing system as well as gas-tight fermentation residue storage.

The biogas facility must document the type and respective quantity of the substrates introduced to the fermenter. This must be documented every working day and as accurately as possible in the operations log. To calculate the GHG emissions incurred for this phase, the biomethane produced must be compared to the substrates used. As a result, the exact biomethane yield must also be documented in the operations log. The biomethane quantity can be measured at the biomass facility in conformance with calibration regulations or continuously transferred by the downstream processing facility.

Biogas production is generally a multi-input process. This is a unique feature. Typically, different substrates are put in the fermenter but the GHG emissions must be shown separately by input material (substrates). It is important that different substrates and intermediate and final products may be mixed with one another but the respective GHG values may not be merged (balanced). This is stipulated in currently valid laws (GHG values may only be balanced if there is a maximum value[4]). Until now, maximum values have only been published for the use of vegetable oils as biofuels and for balancing biodiesel/hydrogenated vegetable oil and ethanol[5].

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[2]There are currently only default values for biogas from organic residential waste, biogas from semi-liquid manure and biogas from dry manure (see Biokraft-NachV).

[3]Source: Fehrenbach et. al. (2010): Biomethan als Kraftstoff: Eine Handlungsempfehlung zur Biokraft-NachV für die Praxis (http://www.ifeu.de/nachhaltigkeit/pdf/Biomethan%20als%20Kraftstoff_Handlungsempfehlung.pdf), accessed on 11.05.2012

[4]see Biokraft-NachV Article 16 (2)

[5]see announcement of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety on the GHG emissions values if biomass is mixed pursuant to Article 16 (3)(1) of the Biokraft-NachV from 8 December 2010 (published in the Federal Gazette on 17.12.2010)

Because there have not been any maximum values for biomethane to date, a separate GHG calculation is required for every individual substrate used. In concrete terms, this means that the biogas yield has to be broken down by the individual substrates and the requirements for mass balancing specified in the REDcert system principles for mass balancing and in the Communication from the Commission (2010/C 160/01)[6] must be satisfied. Different substrates used over the balancing period must be considered separately both in the calculation of the GHG emissions as well as in mass balancing.

As described by Fehrenbach et. al. (2010), it is "not physically possible to assign a causal link between gas yield and substrate... a gas quantity over a balancing period (must) be allocated the same way as when calculating the EEG payment". The energy yields of recognised biomass can be found in Annexes 1-3 of the Biomass Ordinance (BiomasseV). [7]

Once a methane quantity has been clearly allocated to the substrate quantity used which, however, requires consistent facility operation, the gas quantity must also be broken down by the substrates used. Because it is not possible to determine portions of a total methane yield by performing an on-site measurement, data on methane yields from scientifically accepted literature sources (such as, e.g. KTBL values) can be used for help (Fehrenbach et. al.; 2010).

In addition, the diffuse methane emissions from the fermentation process for the respective balancing period must be included in the calculation of the GHG emissions for biogas production. According to Fehrenbach et. al. (2010), methane emissions of 1% of the biomethane produced are considered in line with the best available technology. Lower values may only be used if they can be documented by corresponding measurements.

The emissions produced when fermentation residue is stored in the biogas facility also have to be included in the GHG calculation. The calculated GHG emissions cannot, however, be allocated to the fermentation residue because the fermentation residue has a low content of dry substances and thus the lower calorific value related to the fresh mass is negative (see Fehrenbach et. al.; 2010).

Raw biomass is processed to reach natural gas quality in a biogas processing facility. The biogas processing facility can either be a stand-alone company or form a company unit together with the biogas facility (known as a superinterface). In both cases, the biogas

[6] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2010:160:0001:0007:EN:PDF accessed on 11.05.2012

[7] Ordinance on the generation of electricity from biomass

processing facility is the last interface as defined in the Biokraft-NachV and thus required not only to calculate the GHG emissions incurred in its own operations but also the greenhouse gas emissions savings of the biomethane and to confirm that the sustainability requirements are satisfied in the sustainability certificate.

The GHG emissions calculation must include the emissions incurred when processing raw biogas and the GHG emissions produced in the downstream steps (transport of the biomethane to the filling station and compression to filling station pressure).

In addition to electricity and, if applicable, heat consumption, the methane slip as well as the methane emissions resulting from thermal post-processing must also be included for processing. According to Fehrenbach et. al (2010), the methane slip for pressurised processes (pressure swing absorption (PSA), high-pressure water scrubbing (DWW) or Genosorb® scrubbing) is 5%. Lower values must be verified either through measurements or manufacturer guarantees.

According to Fehrenbach et. al. (2010), the methane slip is below 0.1% for unpressurised processes, particularly amine scrubbing processes in Germany.

To calculate the GHG emissions produced when compressing the biomethane to the filling station pressure of 250 bar as well as transporting the biomethane to the filling station, either values from scientifically accepted literature sources (such as, e.g. the values in the recommendation: Biomethan als Kraftstoff by Fehrenbach et. al.; (2010) or the data measured by the processing facility must be used. Literature sources must be cited exactly, individually measured values must be clearly verifiable in the audit.

As the last interface, the processing facility must issue sustainability certificates. These are to be provided as proof to the biofuel quota office or the chief customs office by the entity that introduces the biomethane to the market[8].

The sustainability certificates must be issued when the biomethane is passed on and submitted to the competent authority (BLE) "immediately". This is not possible in the area of biomethane because billing with the customer does not take place on the basis of supplied and sold m^3 or kg biomethane but on the calculated energy content in kWh in line with calibration regulations. The exact energy content cannot be determined "immediately" on the

[8] Biomethane is considered "on the market" under the Biokraft-NachV when it is taken from the natural gas network as fuel (Fehrenbach et. al.; 2010)

basis of the typical calorific value fluctuations but is only available after the precisely determined values have been received, usually 21 days after the end of the month of delivery. The receipt of these values should thus serve as a reference point for issuing the sustainability certificates. The sustainability certificates must be entered in the Nabisy system within 7 business days.
Conversion is always required for entry in Nabisy using the conversion factor specified by the BLE (3.6 MJ/kWh).

3.4 Requirements for suppliers

The requirements for suppliers are described in the document "System documents for the process step supplier for implementation of the Biomass Sustainability Ordinances (BioSt-NachV and Biokraft-NachV)". All suppliers registered in the REDcert system will be inspected.

3.5 Documentation of mass balancing under the Biokraft-NachV

In the context of sustainability certification for fuels, only the sustainability certificates stipulated by the Biokraft-NachV which have to be entered in the BLE's Nabisy system or the partial sustainability certificates that must be issued via Nabisy are recognised. Documentation in the German "Biogas Register" is not relevant either for crediting to the biofuel quota by the biofuel quota office or for tax relief by the chief customs offices because the Biogas Register is not recognised by the BLE as one of the documentation possibilities for mass balancing under the Biokraft-NachV.
In addition, business processes related to biogas both in the biofuel and bioelectricity sector may not be managed in the Biogas Register parallel to Nabisy once a sustainability certificate has been issued for biogas.