FINLAND - MINISTRY OF EMPLOYMENT AND THE ECONOMY, ENERGY DEPARTMENT, 30 JULY 2007

REPORT PURSUANT TO ARTICLE 10(1) OF DIRECTIVE 2004/8/EC REGARDING THE INFORMATION REFERRED TO IN ARTICLE 5(3) ON THE MEASURES TAKEN TO ENSURE THE RELIABILITY OF THE GUARANTEE OF ORIGIN SYSTEM

Background to the project

EU Directive 2004/8/EY establishes an obligation for Member States to create a system for issuing guarantees of origin for high-efficiency cogeneration of heat and electricity (CHP). The system must be fair, reliable and immune to malpractice. The Directive was adopted and the associated reference values approved earlier, but the detailed calculation instructions were only approved towards the end of 2008. The Ministry of Employment and the Economy and Grexel have jointly executed a pilot project where a few plants were issued, as a trial, CHP guarantees of origin using the draft decree and the AIB-Commission Model. The purpose of the project was to test the functionality of the decree and the model and to identify areas for improvement, as well as to create, in the long run, a functional and reliable practical model for issuing guarantees of origin for CHP and renewable energy sources.

The following parties and organisations participated in the project:

- The Ministry of Employment and the Economy (www.tem.fi) has been preparing a new version of the decree governing guarantees of origin so that it now stipulates the procedures for issuing guarantees of origin for both renewable energy sources and CHP.
- Fingrid (www.finerid.fi) has been specified in the law as the party issuing national guarantees of origin.
- The Association of Issuing Bodies (AIB) (fwww.aib-net.org) has, jointly with the EC Commission, developed an implementation model for the CHP guarantee of origin system (AIB-Commission Model).
- Grexel Systems Oy (www.grexel.com) is a member of the AIB and represents the model in Finland and Sweden.
- Inspecta (www.inspecta.fi) has the necessary capabilities to perform the plant audits required by the decree.
- Helsingin Energia (www.helen.fi) uses CHP technology to generate electricity and heat for the needs of the community, using primarily fossil energy sources.
- Oulun Energia (www.oulunenergia.fi) uses CHP technology to generate electricity and heat for the needs of the community, using renewable and fossil energy sources.
- UPM Kymmene Energia (www.uom-kvmmene.fi) uses CHP technology to generate power for the needs of industry, using primarily renewable energy sources.

1. EECS standard for guarantees of origin

The purpose of the project was to create a model compliant with Directive 2004/8/EC and the EECS (European Energy Certification System, http://www.aib-net.org/portal/page/portal/AIB_HOME/AIB_ASS/EECS) for issuing and administering guarantees of origin. In a separate project, the Finnish system will be officially integrated as part of the EECS. Although this project focused on CHP guarantees of origin, the intention was also to collect development ideas for the process of issuing guarantees of origin for electricity generated using renewable energy sources.

The EECS is a system administered by the AIB (Association of Issuing Bodies); it is based on separating the physical energy and its origin. In the system, the origin of electricity is issued as a separate, saleable certificate, after which there is "just" electricity, without any knowledge of its origin. The system is generally accepted and used in many countries, above all for tracing the origin of electricity and for issuing certificates of origin to the electricity being sold (so-called disclosure) in the manner required by Directive 2003/54/EC. The EECS system is quite widely used and recognised in the legislation of many countries. During 2008, guarantees of origin for renewable electrical energy corresponding to about 160 TWh were issued under the EECS system; this is about 30% of the total generation of renewable electricity in the area. EECS guarantees of origin corresponding to 5–8 TWh are exported annually from Finland to different countries including Holland, Belgium and Germany.

2. Piloted operation processes

2.1. Plant registration process

Registration of the plant means including it in the system and verifying its details in the manner required by regulations and standards. The process starts with entering the plant details in the system and ends when all documentation has been approved and the starting date (the day from which guarantees of origin may be issued for current production) has been determined. The process includes a plant audit carried out on site by the auditor and approval by Fingrid.

The process consists of the following stages:

1. The producer enters the details of new equipment in the register system. It is assumed here that the producer has already been registered with the system. The following details of the plant are entered:
    a) Name of the plant
    b) Is the equipment connected to the national grid? If not, further information is required.
    c) Location (address) of the equipment
    d) Maximum power of the equipment
    e) Date of commissioning

f) Estimated annual output
g) Details of the party operating the equipment if different from the one registering it
h) What are the plant certificates required for (CHP-GO, RES-GO. RECS, Disclosure)
i) The CHP technology deployed
j) Power to heat ratio
k) Thermal energy category
l) Connection voltage
m) Types of fuel used by the plant and their respective calorific values
n) Any public investment or production subsidies applicable

When all equipment details have been entered, Grexel checks them for obvious errors. When Grexel has issued a preliminary approval for the equipment, the producer may print out a registration form (RED) from the system, containing all registered details of the plant.

2. The producer sends a request for registration audit directly to Inspecta. At the same time, the auditor is sent the RED form which has been printed from the system and signed by the producer's authorised signatory.

3. The auditor carries out the audit and signs the RED form for his/her part. Any deviations observed are hand written on the form. If the plant does not comply with the conditions set out in the relevant act or decree, the auditor will not sign the form but instead issues a separate protocol for the audit.

4. The signed RED form is sent to Fingrid accompanied by the main electrical and heat diagrams showing the location of meters and gauges.

5. If Fingrid approves for its part the inclusion of the plant in the system, it sends the registration form and copies of the diagrams to Grexel, accompanied with its own supporting statement of expert opinion.

6. Having received all the documentation, Grexel approves the equipment in the system and enters the earliest possible date from which guarantees of origin may be issued to the plant.

The stages and responsibilities in the plant registration process are shown in the diagram below.

Auditor	Fingrid	Producer	Grexel
		Enter equipment details in Grexel's register	Equipment details entered in the system

Carry out the audit

Request an audit for the equipment

Approve/reject and enter the decision in Grexel's system

Can the equipment be included in the scope of CHP-<50? Register the decision
Print out the required documentation

Enter the opening date for the equipment, if approved

Diagram 2: Plant registration.

2.2. Issuance of guarantees of origin

The issuance begins with the producer sending the necessary measurement data and a signed declaration of production to Fingrid. The producer deploys the AIB-Commission calculation model (Excel) for the calculations. As final output of the process, guarantees of origin are created for the producer's account. The issuance process consists of the following stages:

1. The producer sends the equipment measurement data (note: gross measurement accepted) using the normal EDIEL method to Fingrid. In addition, the producer sends a signed production declaration showing the volume for which guarantees of origin are sought. The production declaration form can be printed out from CHP-GO Finnish Domain Protocol.
2. Fingrid checks that the volume applied for can be issued using its own measurement data, the AIB-Commission calculation model and details of the production declaration.
3. If Fingrid approves the issuance, they send the details to Grexel. This is deemed to constitute the official issuance of national guarantees of origin.
4. Grexel issues the EECS-CHP-GO guarantees of origin using the data obtained from Fingrid. Before this, Grexel checks that the plant and production details also comply with the conditions of the EECS system in addition to the Finnish national conditions. If guarantees of origin of renewable energy are

also applied for the same production or part of it, they must be applied for at the same time. When one guarantee of origin for a certain megawatt-hour produced has been issued, it cannot later be supplemented with other characteristics nor can a separate guarantee regarding renewability be issued, for example.

The process diagram for issuing a guarantee of origin is shown below.

Fingrid	Producer	Grexel
Receive, approve and save the data	← Send equipment measurement data and account of fuel used	
	← Request issuance of CHP-GO for the equipment	
Send production data, account of fuel used and request to Grexel's system ----------	---------->	Receive and issue CHP-GO for the equipment
		↓
Receive acknowledgment		Send acknowledgment of issuance
	Receive acknowledgment	

Diagram 2: The issuance process.

3.Project stages and planned schedule

The planned stages and time schedule of the process are shown in the Gantt chart below.

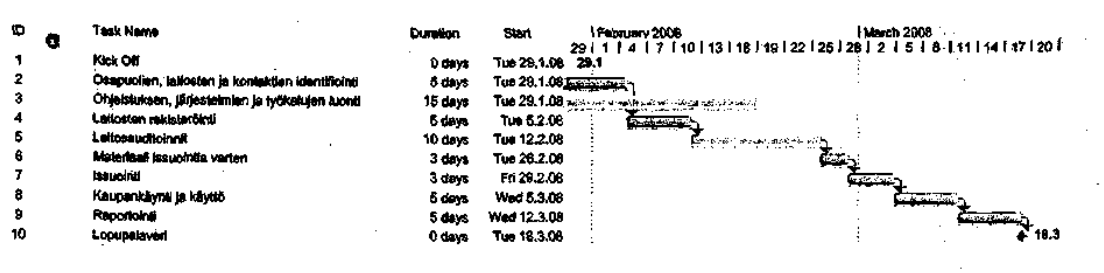

Figure 1. The project plan

Key:

1 Kick-off
2 Identification of parties, plants and contacts
3 Creation of instructions, systems and tools
4 Registration of plants
5 Plant audits
6 Materials for issuance
7 Issuance
8 Trading and use
9 Reporting
10 Final meeting

The actual pilot phase began after the compulsory planning and coordination stages. The pilot stage consisted of registration of the plant, issuance of guarantees of origin as well as trading in them and using them.

4. Deviations from the project plan

The project was considerably delayed from its envisaged time schedule. The main reason for the delay was the significant delay in receiving the Commission Guidelines compared with the assumed schedule. The Guidelines are more detailed technical specifications regarding how the guarantees of origin should be issued and what volumes of energy they may be issued for. Since it is essential to be able to evidence energy savings compared with separate production, many factors and aspects have to be considered in the calculations. After the Directive had been adopted, agreeing these was left to be done through the comitology procedure. In comitology, the countries were represented by civil servants with various national and international interest groups behind them. Their differing views and the technically complex subject are likely to be the main reasons for the comitology procedure being delayed by more than one year from the envisaged schedule. The AIB has developed a detailed Excel-based calculation model for calculating the volumes of CHP guarantees of origin. The calculation details naturally had to wait for the comitology procedure to be completed. The AIB did not want to release the calculation model even for use by its members because there was a risk that incorrect models would "survive" and there would be resulting responsibility issues.

Another important deviation was “shortcutting” some final stages of the process for scheduling reasons. The original plan was to have the power companies participating in the pilot submit signed production declarations based on actual data for Fingrid to check using its own sources. Since the calculation model only became available a few weeks before the end of the project, issuance had to be effected using artificial data. This is of no significance for the end results, because the resulting guarantees of origin are in any case unofficial as the decree is not in place.

5. Areas identified for development

5.1. Division of responsibilities between parties, and tariffs

In the current model, several parties in addition to the producers are required to register the plant and issue the guarantees of origin. The plant registration process involves the following parties:

- The producer
- Fingrid

- Grexel
- The auditor

The issuance process involves the following parties:

- The producer
- Fingrid
- Grexel

Under current legislation, Fingrid is responsible for issuing the national guarantees of origin. Grexel is responsible for implementing the EECS in Finland. Inspecta acts as the agent for both Fingrid and Grexel, verifying that the registered details of production equipment are correct. Hence, Fingrid is responsible for issuing national guarantees of origin and Grexel for converting them into the (electronic) format required by the EECS and for links to similar systems operated in other countries.

All parties decide on their tariffs themselves and charge the costs to the producer. Fingrid collects fees for registered production equipment and from operators (annual charge) and for issued guarantees of origin (for each issuance). Grexel collects fees from operators (annual account charge) for production equipment registered in the EECS system (annual charge) and for issued guarantees of origin (per MWh). The auditor charges for the audits carried out.

As a whole, the system is difficult to comprehend in spite of its internal logic, and it encourages results that are less than optimal overall. The producers, for example, optimise issuance costs by requesting guarantees of origin as infrequently as possible because the charge imposed by Fingrid is based on the number of issuances. On the other hand, the EECS system maintained by Grexel in Finland limits the length of production runs in issued guarantees of origin in terms of calendar time. Another aspect is that the accumulating costs are burdensome to small production plants, such as small wind farms for example, when compared to the market price of guarantees of origin.

It would be more logical from the point of view or producers if the were offered a “one-stop” model for dealing with official requirements and tariffs. This could be implemented within the framework of current legislation and arrangements so that the producers would only have a single point of contact in their dealings with authorities, for example Fingrid or Grexel, while other parties would act as the producer’s agents. Grexel, for example, could subcontract auditing services and deal with Fingrid with the producer’s proxy.

5.2. Ensuring the reliability of measured data and fuel usage

Many countries operate a system for collecting measured data and verifying its correctness where the meter is owned by a different (regulated) organisation. In countries where there is a subsidy system based on feed-in tariff, for example, the system information can also be used to verify the correctness of measured data used for issuing guarantees of origin.

In Finland, the producers in many cases own the metering system and supply Fingrid with the data required for different purposes. For example, verification of the production volume of a plant that is operating in the proprietary network of an industrial plant and using in part renewable fuels cannot be done in a cost-effective manner. The problem may arise when the system is described as part of the international standard. A service company operating abroad and using bio-electricity, for example, may find it difficult to trust the system unless the reliability of information can be verified in a watertight manner.

Cogeneration of electricity and thermal energy usually takes place by burning fossil or renewable fuels. It is a prerequisite for issuing certificates that the quantities of fuel used, the share of each type of fuel and their calorific values can be reliably verified. The fuels possibly used at the plant and their calorific values are verified during the registration audit carried out when registering the plant. Instead, the operative figures — with the exception of the quantity of electricity generated — are based on the producer's own reports. This is why production audits are commonly used for analysing the quantities of fuel that have been used and comparing them with the producer's reports. Official emission reports are used in the case of guarantees of origin for renewable energy, for example.

However, their use is not without problems because not all plants to which guarantees of origin are issued are involved in emissions trading. Furthermore, there are differences in certain requirements and standards.

In the long run, the metering and reporting requirements should be developed so that reliable information on the usage of different fuels and own use of energy would also be available for issuing guarantees of origin. This could be accomplished by a combining the collection of information for guarantees of origin, emissions trading and state production subsidies.

5.3. Physical form of guarantees of origin

In Finland, the Act and Decree in force, or those being planned, do not specify the physical form of the guarantee of origin. In principle, this allows issuing guarantees of origin in paper form, and this has taken place to a certain degree. However, the paper form has the problem that it is difficult to prevent double accounting. After all, it is easy to produce copies of paper documents.

The system should be developed so that the law would contain requirements regarding:

- the electronic form of guarantees of origin;
- a central register for keeping track of ownership details;
- cancellation of guarantees of origin when they are used.

All these are currently included in the EECS and also in the new RES Directive which means that the solutions have already been found.

5.4. Coordination of renewable and CHP GOs

The requirements concerning guarantees of origin for renewable energy (RES-GO) and CHP (CHP-GO) are contained in different directives, and there is no requirement in legislation that they should be combined. It

would therefore be possible, in principle, to issue two separate guarantees of origin for one megawatt-hour of energy produced (a high-efficiency cogeneration plant using bio-energy). Since the most important purpose of guarantees of origin is to allow the origin of electricity used to be tracked, two systems related to the same unit of electricity would not necessary be the optimal solution.

In Finland, both guarantees of origin are covered by the same act and decree. It would be a good idea to include a specific clause in the decree to the effect that only one guarantee of origin can be obtained for one MWh produced and, if both characteristics are desired, they should be applied for at the same time.

The other potential problem is associated with measurements. The Commission has suggested that measurement of production for the purpose of CHP guarantees of origin refers to gross production (without deducting own use and grid losses). On the other hand, guarantees of origin regarding renewable energy are commonly issued for net energy. Therefore, if the definitions are meticulously followed, three types of guarantees of origin would at best be issued to one plant. The figure below clarifies the issue.

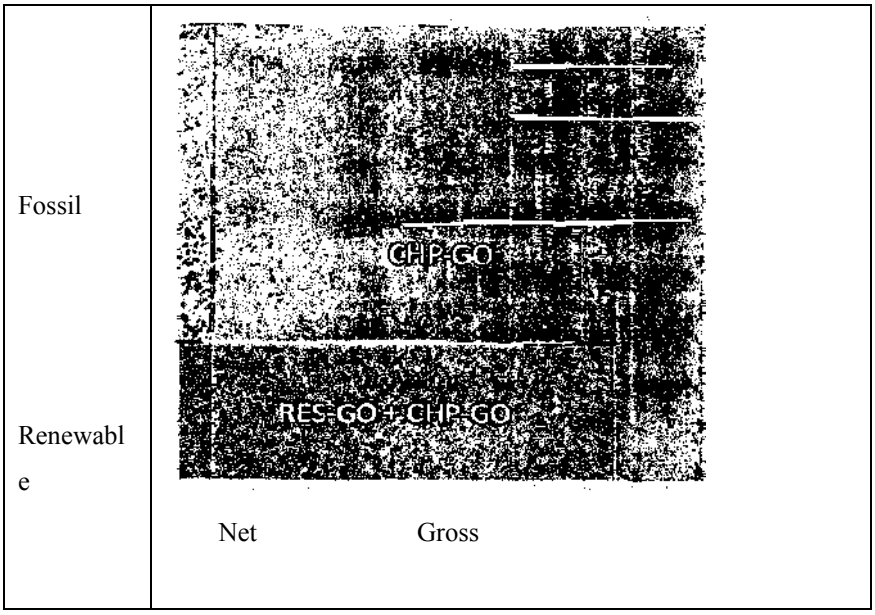

Figure 2: CHP-GO and RES-GO

The new RES Directive specifies that the purpose of a guarantee of origin of renewable energy is to allow the tracking of electricity for the purpose of an origin label. On the other hand, the CHP guarantee of origin must not be used for indicating that the electricity is from a renewable source. That means that the energy produced using renewable sources in the above figures (gross-net) could be sold as produced using efficient cogeneration, but not as renewable.

In practice, own use and grid losses have not been sold to anybody (as energy). Therefore, it would be possible to specify, at the decree level, the net energy produced as the maximum volume for both RES and CHP guarantees of origin even if gross production were to be used in efficiency calculations.

5.5. Development measures related to IT systems

In the pilot project, a development version of the so-called GrexCMO system (www.grexcmo.com) developed by Grexel, supplemented with the necessary CHP extensions, was used for issuing, transferring and cancelling certificates. The production version of this system is currently used for issuing the official renewable energy guarantees of origin in Finland, Sweden and Germany. In addition, another embodiment of the same system entitled RECSCMO (https.//www.recscmo.org) is used in Norway, Denmark, Slovenia and Austria. In all, these systems issue some 80% of all EECS guarantees of origin in Europe. The origins of the system date back to 2001 when the first so-called RECS certificates were issued. Thanks to the long history of usage and development, its functionality and reliability are of a good standard, but it is also getting old, and it can be clearly seen that the system is approaching the end of its useful life as a result of numerous extensions, new interfaces and modifications.

In particular, more advanced processing of different types of certificates would be welcome, together with better public reports. The basic technology and data structure solutions are also in part relicts from the stone age of certificates. Grexel is currently in the process of developing the next generation system that is based on new technology and takes into account the requirements of both current legislation and the new RES Directive.

5.6. Changes brought by the new RES Directive

The new RES Directive was adopted by the European Parliament and Council in late 2008. It contains many important improvements and further specifications regarding the issuance and intended usage of guarantees of origin. The main changes compared to the old RES Directive (2001/77/EC) regarding guarantees of origin are the following:

- The purpose of guarantees of origin is clearly expressed: they are used for the origin label of electricity (Directive 2003/54/EC)
- The Member State must nominate one body (or several each with geographically specific areas to handle the issuance and administration of guarantees of origin
- International transfers of guarantees of origin have no effect on the calculation of national targets for renewable energy
- Besides electricity, the Member States can also issue, at their discretion, guarantees of origin for thermal end cooling energy produced using renewable natural resources.
- The life of guarantees of origin is 12 months from production date
- The guarantees of origin must be issued in electronic form

The changes mean that the Member States have to take certain actions, and Finland also has to reform its act and decree. The new directive enters into force in 2010, so there is not much time for the changes. Most of the directive text concerning guarantees of origin was as expected, and also the EECS system used in this project already fulfils many of the requirements of the new directive. The most significant difference is the strict age

limitation of 12 months for the guarantees of origin and the possibility of issuing guarantees of origin for thermal energy produced using renewable sources of energy.

6. Conclusions

As the output of the project, we can conclude that it is possible to issue and administer guarantees of origin of electricity produced by efficient cogeneration (CHP) using the pan-European EECS system and most of the existing structures and data systems in place for renewable energy guarantees of origin. It transpired during the project that the amount of data, calculations and verifications required for CHP guarantees of origin are a degree of magnitude more extensive than those required in the case of renewable energy. It also turned out that agreeing technical details at the international level poses certain challenges. This became apparent both when the instructions were being prepared through the comitology procedure and when the AIB calculation model was being developed. However, an internationally harmonised system is an absolute necessity for creating the markets for guarantees of origin and thus increasing the value of guarantees.

It would appear that there is some budding demand for CHP guarantees of origin, for example in the Netherlands, but when one takes into account all costs and plant registrations and verifications as well as the transaction costs, it is unlikely that actual business would be created in this field for some years to come. However, this is possible in the five-year time span. On the basis of experience gained from renewable energy guarantees of origin, we can state that the “learning curve” for putting such systems into operation is long, even years. Finland is a forerunner in the field of markets for renewable energy guarantees of origin, and new enterprises and exports have been created in this field. For CHP guarantees of origin, it would seem sensible to introduce the EECS system from the outset irrespective of the undeveloped state of markets, because it can be used fairly easily and cost effectively by utilising the existing structures. The creation of a different, for example paper-based system on the other hand does not seem a sensible proposition, in particular considering the requirements of the new RES Directive. As a separate project that was nevertheless part of the same complex, the introduction of a guarantee of origin system for efficient cogeneration and its integration with the EECS system is already in progress.