



# Residual mix in the Nordic countries

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# 1 Sammandrag

I 2011 genomförde Arbetsgruppen för Förnybar Energi (AGFE) en konsultutredning som utmynnade i en rapport där de nordiska ländernas system för hantering av ursprungsgarantier kartlagdes och där olikheterna i praxis de olika länderna för rapportering av den sk. residual-mixen beskrevs. I rapporten påpekades vikten av att harmonisera beräkningarna för residual-mix i Norden och att metoderna borde basera sig på rekommendationer från RE-DISS projektet.

Metoderna för rapportering av residual-mixen i de nordiska länderna är ännu inte harmoniserade. Detta har lett till att det fortsättningsvis kan förekomma en viss dubbelräkning av de förnybara attributen på nordisk nivå som beror på att man parallellt använder nationella och nordiska, Nord Pool baserade kalkylmetoder.

Baserat på ett beslut av MR-NER vill AGFE-gruppen nu utreda fördelarna och nackdelarna för de här två alternativa metoderna för olika parter i marknaden dvs. producenter, elförsäljare, slutförbrukare, konsumenter, NGOer och andra marknadsparter som berörs av beräkningarna. Studien genomfördes under en period mellan mars och maj 2012. Inom studien genomfördes en genomgång av rapporter och utlåtanden om residual mix frågan, samt 15 intervjuer av myndigheter, producenter, återförsäljare, slutförbrukare och NGOer i de nordiska länderna. Också nyckelpersoner i organisationer som ansvarar för kalkyleringsmetoder i praktiken, Grexel och RE-DISS, intervjuades.

Målsättningen med rapportering av elens ursprung till konsumenter är att konsumenterna skall få pålitlig information om hur den el de köper har producerats. Konsumenterna kan som följd göra produkt val som baserar sig på andra kriterier än bara pris. RE-DISS har gjort rekommendationer som gäller rapportering av den så kallade residual mixen av el. Man kan välja att rapportera på region nivå, i fall alla länderna i regionen har kommit överens om detta, eller att rapportera på nationell nivå. En region är ett område som kan anses vara integrerat så som till exempel den nordiska marknaden är.

Nuvarande praxis för rapportering av den så kallade residual mixen i Norden följer inte RE-DISS rekommendationer. För tillfället rapporterar Sverige och Finland på nordisk nivå och Danmark på nationell nivå. I princip, följer Danmark, Finland och Sverige RE-DISS rekommendationer i sina egna beräkningar, men koordination på region saknas. Norge rapporterar på nationell nivå men följer för tillfället inte RE-DISS rekommendationer. Att rapportera på nordisk och nationell nivå parallellt leder till dubbelräkning av el som producerats från förnybara källor. Detta kan medverka till att konsumenternas tillit till marknaden minskar och kan hindra konsumenter från att göra aktiva val som baserar sig på sanningsenlig och tydlig information.

Tekniskt sätt kan båda alternativen i princip vara lika pålitliga om samma regler för data insamling, beräkningar och rapportering till slutkund följs. I praktiken skulle dock valet av den nordiska residual mixen kunna medverka till en något snabbare harmonisering av praxis mellan länderna.

På basen av intervjuerna som genomfördes kan man säga att den viktigaste frågan är vilket alternativ som ger rätt bild av elens ursprung och tillförlitlighet. Den viktigaste fördelen som nämnts i samband med den nordiska mixen är att den mer korrekt reflekterar att den nordiska engros marknaden är integrerad och därmed elens fysiska ursprung. Marknadsparter och industriorganisationer speciellt i Finland och Sverige ser detta som viktigare i utvärderingen av elens ursprung än var produktionen i dagens läge fysiskt befinner sig eller om slutkundsmarknaden är integrerad eller inte. Även de intervjuade elförsäljarna och slutkunden som intervjuades i Norge, var av den åsikten att en nordisk mix ger en mer korrekt bild av den fysiska verkligheten.

Om man tar till hänsyn det begränsade antalet intervjuer, kan man dock anta att det också kan finnas avvikande åsikter bland norska elförsäljare. Intervjuade personer i Danmark påpekade att man speciellt i Danmark också är integrerad till övriga Europa. Danska intervjuade påpekade också att den nordiska residual mixen kunde ge försämrade incentiva till nya investeringar i vindkraft i Danmark.

De myndigheter som ansvarar för rapportering, dvs. regulatorerna, var i Sverige och Finland av den åsikten att den nordiska residual mixen är mer korrekt. I Danmark och Norge är man mer fokuserade på vad slutkunder i dag uppfattar som en marknad och förespråkade därför en nationell mix.

Regulatorerna i alla länder håller med om att en gemensam nordisk slutkundsmarknad skulle innebära att den nordiska residual mixen skulle vara alternativet att föredra, både från återförsäljarens och konsumentens synvinkel, i fall en gemensam nordisk slutkundsmarknad bildades. Den skulle minska arbete med rapportering och vara tydligare för konsumenten.

De största skillnaderna i utfallen mellan beräkningarna (nordisk eller nationell) ses för Danmark och Sverige. I en nordisk mix får Danmark ett relativt stort inslag av kärnkraft och en minskad andel vindkraft och Sverige ett relativt stort inslag av fossil produktion. De olika alternativen innebär därmed för Danmarks del en minskning och för Sveriges del en ökning av CO<sub>2</sub> utsläpp i mixen. Norge som i dag exporterar en stor del av sin vattenkraft får ett stort inslag fossil och kärnkraft produktion i sin mix, vilket alternativ som än väljs. Skillnader i produktionsmix eller CO<sub>2</sub> utsläpp borde dock inte figurera i valet av metod, utan valet borde göras på basen av vilket alternativ som ger en mer korrekt bild av elens ursprung. Alla parter som intervjuades i studien var ense om att beslut inte kan basera sig på vilket alternativ som skulle ge ett mer önskat utfall för landet.

En fråga som måste utvärderas i det här sammanhanget är vad som borde göras på kort sikt i den nuvarande situationen där nordisk och nationell residual mix används parallellt. Fastän man kan bedöma att det kan finnas fördelar i att fortsätta med nuvarande praxis tex. för att säkra kontinuitet i rapporteringen till slutkunderna, så måste det ändå vägas mot det fakta att det innebär fortsatt dubbelräkning av förnybar energi. Om det inte kan ingås ett beslut om att Norge och Danmark använder nordisk mix så kan man anse att Finland och Sverige borde åtminstone på kort sikt övergå till att använda nationell mix fastän den kanske inte kan anses ge en rätt bild av den integrerade engros marknaden, och därmed elens ursprung. Däremot borde man i alla nordiska länder lämna öppen möjligheten att övergå till en nordisk mix eftersom den på sikt kommer att vara den bättre lösningen.

## 2 Background

### 2.1 Disclosing the origin of electricity in the EU

In accordance with the Electricity Market Directive<sup>1</sup>, all suppliers of electricity are required to disclose their electricity portfolio with regard to energy source and environmental impact, specifying the emissions of CO<sub>2</sub> and the production of radioactive waste. The aim of these requirements for electricity disclosure is to provide consumers with relevant information about power generation and to allow for informed consumer choice

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<sup>1</sup> Directive 2009/72/EC, Article 3(9)

which would not only be based on electricity prices. The regulatory authority in each country has to ensure that the information on the origin of electricity provided by suppliers to their customers is reliable and is provided, at a national level, in a form which easily enables comparison.

The Renewable Energy Directive<sup>2</sup> defines a guarantee of origin as a means of proving the origin of electricity. In the case where electricity delivery is not based on a Guarantee of Origin the disclosure to customers should be based on a residual mix of electricity. The residual mix is calculated so that the renewable attributes covered by guarantees of origin which have been cancelled in the region or in a third country have been removed.<sup>3</sup>

## 2.2 Background and goal of the study

In 2011, AGFE, the Working Group on Renewable Energy commissioned a study where the systems of Guarantees of Origin and disclosure of the origin of electricity in the Nordic countries were studied. One conclusion of the study was that the practices for disclosing the origin of electricity, which is not backed by guarantees of origin, i.e. the so called residual mix, are in need of harmonization. Another conclusion was that the calculations should be based on the recommendations made in the Reliable Disclosure project (RE-DISS project).

The methods for reporting the residual mixes are still not harmonized in the Nordic area. In some cases this has led to double counting of the renewable energy attributes. This is a result of residual mix calculations on a Nordic level and national level being applied in parallel in the Nordic countries. There is a need to choose common principles to ensure that reporting to consumers is transparent and reliable.

In practice there are two alternatives to choose between for how the residual mix should be disclosed to electricity consumers in the Nordic area. One alternative is that the four Nordic countries calculate the residual mix for each country separately. The other alternative is that the four Nordic countries all agree on using a regional residual mix based on the Nord Pool market area, and that all four countries use this same residual mix for disclosure to end users. In both alternatives the calculation methodology would be based on the methodology developed in the RE-DISS project where calculation methods, time limits, and reporting are harmonized.

The goal of this study is to weigh the benefits and drawbacks of the two alternatives from the perspective of producers, suppliers, consumers and other key stakeholders. One aspect, which is also considered when the alternatives are evaluated, is the plan to create a common Nordic retail market.

It should be noted, that if all market participants would use guarantees of origin for disclosure and tracking of electricity, there would be no need for residual mix calculations. However, in the current market reality, residual calculations are needed to give consumers reliable information about their electricity use.

The study was performed by Gaia Consulting Oy of Finland in April–May 2012 partly as a desk study where reports published on the subject have been studied and partly by interviewing key stakeholders in the four Nordic countries. The interviewees include the authorities responsible for disclosure, organizations which

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<sup>2</sup> Directive 2009/26/EC

<sup>3</sup> Source: Osfoldresearch rapport October, 2011

represent the industry, suppliers, NGOs, the management of the RE-DISS project and Grexel. The list of interviewees is given in Appendix A.

## 3 Current practices and residual mixes for 2010

### 3.1 RE-DISS Best Practice Recommendations<sup>4</sup>

There is harmonization work on going on a European level on disclosure of the origin of electricity. The RE-DISS project has published Recommendations for Best Practice for electricity disclosure. The recommendations outline that countries in Europe should cooperate in order to adjust their residual mixes so that cross border transfers of physical energy, guarantees of origin and other reliable tracking systems are taken into account. Countries should use data provided by RE-DISS to make these adjustments and they should also support the collection of input data for the related calculations.

The recommendations outline that as a default, the residual mix should be calculated for each nation. However, if electricity markets of several countries are closely integrated (e.g. in the Nordic region), a regional approach to the residual mix may be taken. The recommendation states that this should only be done after an agreement has been concluded between all countries in this region, which ensures a coordinated usage of the regional residual mix.

### 3.2 Sweden and Finland

Figure 1 illustrates the residual mix calculations which are currently applied in Finland and Sweden. Both disclose the residual mix on a Nordic level. Guidelines by RE-DISS project are followed in the reporting. The respective CO<sub>2</sub> emissions are disclosed for the residual mixes.

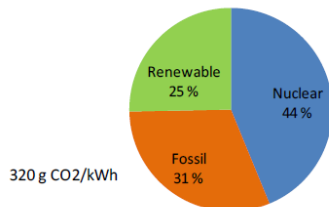
The differences in the Swedish and Finnish Nordic residual mix calculations originate from differing reporting periods. Optimally, the Nordic residual mix should be the same for the whole Nordic area. Of the two presented the Swedish calculation is more recent and can therefore be considered more correct.<sup>5</sup>

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<sup>4</sup> Best Practice Recommendations for the implementation of Guarantees of Origin and other tracking systems for disclosure in the electricity sector in Europe, RE-DISS, Version 1.1, 8 April 2011

<sup>5</sup> The Swedish calculation dated 29.08.2012 is the more recent calculation and includes more tracked contracts. It is thus more correct than the Finnish disclosure statement.

Swedish Residual Mix 2010 (Nordic domain)



Finnish Residual Mix 2010 (Nordic domain)

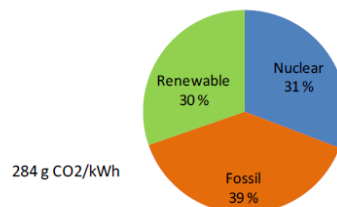


Figure 1. The Nordic residual mix calculated reported by Sweden and Finland 2010 and related CO<sub>2</sub> emissions.<sup>6</sup>

### 3.3 Denmark

In Denmark a National level disclosure is applied since 2010 and the principles for calculating the residual mix outlined by the RE-DISS project are followed. Figure 2 illustrates the Danish disclosure. The Danish disclosure of the residual mix is calculated on a national level. Danish disclosure to customers includes also detailed disclosure of CO<sub>2</sub> and other emissions. To change practices and adopt a disclosure on a Nordic level would require legislation changes.

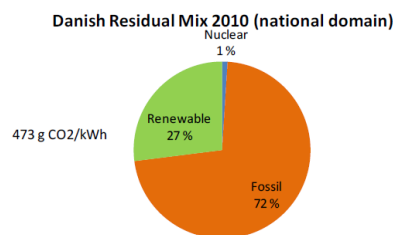


Figure 2. Danish residual mix with associated CO<sub>2</sub> emissions.

### 3.4 Norway<sup>7</sup>

In Norway the disclosure is regulated by the "Forskrift om måling, avregning og samordnet opptreden ved kraftomsetning og fakturering av netjtjenester".<sup>8</sup> The Norwegian Water Resources and Energy Directorate (NVE) is responsible for the calculation of the national electricity residual mix for disclosure for each calendar year.

<sup>6</sup> Source: Swedenergy, Vägledning angående ursprungsmärkning av el, dated 39.08.2011 and Finnish Energy Industries, Guidelines on residual mix, dated 6.7.2011

<sup>7</sup> Norway has on 11.6.2012, after the writing of this report published a residual mix calculation based on RE-DISS standards for 2010 (retroactively) and 2011. The calculation has been done on a National level.

<sup>8</sup> Forskrift om måling, avregning og samordnet opptreden ved kraftomsetning og fakturering av netjtjenester, [www.lovdata.no/for/sf/oe/te-19990311-0301-008.html#8-5](http://www.lovdata.no/for/sf/oe/te-19990311-0301-008.html#8-5)

Formatert: Norsk (bokmål)

National disclosure includes the respective percentage of the fuels hydropower, wind, biomass, fossil, unknown and import. In the national production based fuel mix the share of exported Guarantees of Origin is replaced by “unknown origin”. Imported electricity equals gross imports. Gross physical exports are deducted from the sources in the production mix proportionately.<sup>9</sup>

The current disclosure statement itself does not include information on CO<sub>2</sub> emissions. However, the NVE website also explains that related CO<sub>2</sub> emissions for electricity consumption depend on the composition of the imported and unknown shares and gives reference to the average European power generation with a specific emission factor of 374,6 g/kWh.<sup>10</sup>

### 3.5 The two alternatives which are considered

The results of the residual mix calculations using both the Nordic and national approaches for the year 2010 are illustrated in Figure 3. The highlighted line indicates the amount of renewable energy in the Nordic mix. The results have been calculated in the RE-DISS project in June 2011.

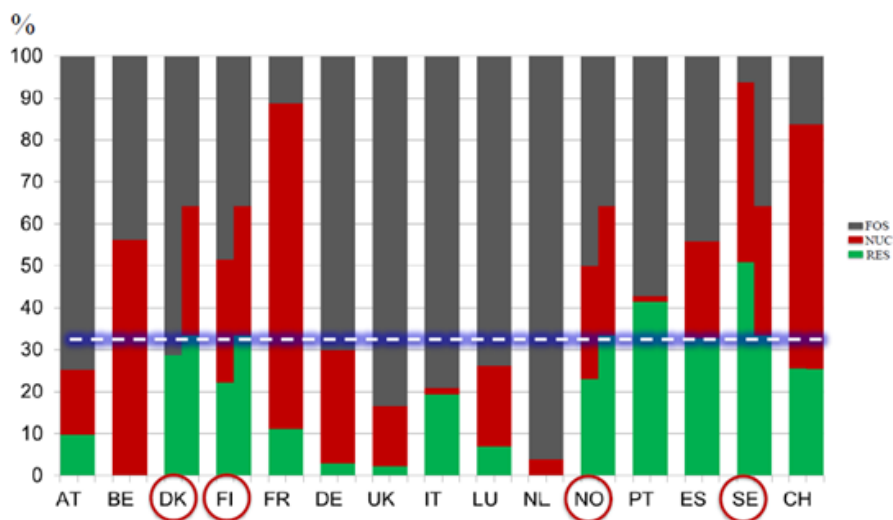
The greatest differences in the residual mix when the two approaches are compared can be seen for Sweden and Denmark. For Sweden the national disclosure leads to very low CO<sub>2</sub> emissions because of the low fossil based production content in the mix compared to current disclosure on a Nordic level. In the Nordic disclosure more fossil based production is added to the supply mix. For Denmark the fossil production will be reduced and more nuclear production will be added to the mix if a Nordic residual mix is adopted. In addition the proportion of wind power will be reduced. This would for Denmark lead to reduced carbon dioxide emissions as part of the fossil based production is replaced with nuclear production.

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<sup>9</sup> Kristin Kolseth, NVE

<sup>10</sup> RE-DISS Country profiles: Norway





**Figure 1.** Residual mixes for electricity in some European countries calculated on a national and on Nordic level for 2010<sup>11</sup>.

For Norway or Finland the changes would not be as drastic. Norway sells a great deal of its renewable attributes to other areas and the national mix calculated according to RE-DISS principles and methodology, thus, already includes a large proportion of nuclear and fossil based production. The exact emissions levels of CO<sub>2</sub> are shown in Table 1 below.

**Table 1.** CO<sub>2</sub> emissions in the national and Nordic residual mixes.<sup>12</sup>

	Emissions gCO <sub>2</sub> /kWh in residual mix for 2010
Denmark	562,6
Finland	373,59
Norway	392,48
Sweden	36,35
Nordic	320,02

It is likely that Finland will start using a national residual mix as there is no agreement on a Nordic approach between all Nordic countries.<sup>13</sup> In Spring 2012, legislation is being prepared along these lines.

<sup>11</sup> Source: RE-DISS project, June 2011.

<sup>12</sup> Source: EU ETS 2010

<sup>13</sup> Finnish Energy Market Authority, Mikko Heikkilä, Interview

NVE plans to continue with a national disclosure. NVE considers that Norwegian customers see the market area as being Norway. This is seen as the motivating factor for choosing this approach. NVE finds that the level of integration of both the wholesale and retail market will be a factor when considering adopting a Nordic residual mix. Further improvements of defining the attributes used for substitution of unknown shares (including unknown physical imports) with a residual mix based on RE-DISS project calculations is planned by NVE for 2011<sup>14, 15</sup>.

The Energy Market inspectorate (EI) in Sweden has in 2011 decided to continue with a Nordic level disclosure.

## 4 Views on the residual mix calculation alternatives

### 4.1 Authorities

**Energinet** in Denmark considers that the current national disclosure of the residual mix is for the time being easier for the customers to understand. However, when there is a common Nordic retail market then the Nordic residual mix is seen as having several benefits and would be the right choice. A benefit of the Nordic mix after a joint retail market has been established is that it would force to follow common rules, time limits etc. It would also be clearer from the customers' perspective if all Nordic suppliers use the same type of residual mix disclosure. One concern related with using the Nordic residual mix, however, is whether the benefits from investments into Danish wind power will be transferred to other countries and whether this is desirable. Stakeholders in Denmark are not very concerned with an additional nuclear component in the Nordic residual mix. Energinet emphasizes that European common rules should be followed by all and that the market is not today purely national or Nordic but increasingly a European market.

**Energimarknadsinspektionen (EI)** in Sweden is of the opinion that the residual-mix should make up a relatively small proportion of disclosure of electricity and that most of electricity should ideally be disclosed with guarantees of origin. This would in time eliminate the problems of double counting of attributes, which still exist in the residual mixes and the implicit tracking in general. The residual mix for Swedish disclosure is proposed to be calculated on a Nordic level also in the future. The Nordic market is seen as integrated because of the extensive trade in the wholesale market and this is seen as the decisive factor when choosing between national or Nordic level disclosure of the residual mix. One additional motivating factor is the preparation for a future enlargement of the domain geographical area.<sup>16</sup> EI considers that the Nordic countries should in the future make up one domain from which guarantees of origin will be traded with the rest of Europe.

EI considers that reverting to a national residual mix calculation would for the time being reduce double calculation. However, changing to a national calculation on a short term and then reverting back to Nordic after a few years, when there is a common Nordic retail market, would in the opinion of EI be confusing for customers and is seen to possibly undermine trust in the market. In addition, changing reporting from one method to

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<sup>14</sup> Source: Kristin Kolseth, 25.4.2012

<sup>15</sup> NVE has implemented the changes referred to in the text on 11.6.2012 and is now following RE-DISS recommendations.

<sup>16</sup> Energimarknadsinspektionen EI R2011:10 Ursprungsmärkning av el

another is seen as causing some discontinuity in the reporting to end users and in some end user reporting (for example corporate sustainability reports etc.).<sup>17</sup>

**Energimyndigheten** in Sweden, however, considers that eliminating double counting associated with current mixed practices outweighs other considerations until all nations can agree on a Nordic residual mix. A Nordic regional calculation is considered as being more correct considering the integrated wholesale market, but the elimination of double counting is seen as the most essential factor to be weighed in. Energimyndigheten has expressed this view in an official statement to the Energy Market Inspectorate of Sweden.<sup>18</sup>

**NVE** in Norway considers that the decisive factor in choosing a national approach is that the end customers in Norway consider the electricity market to be Norwegian. NVE finds that the level of integration of both the wholesale and retail market will be a factor when considering adopting a Nordic residual mix.<sup>19</sup>

It is the opinion of the **Energy Market Authority** in Finland that the Nordic residual mix would more correctly represent the origin of electricity in the Nordic area considering the integration of the wholesale market. However, a national residual mix will be taken into use in order to take steps to eliminate the double counting in the current practice, where national and regional mixes are used in parallel for disclosure in different countries. Legislation along these lines has already been drafted. The main benefit seen in adopting a national approach is taking a step to avoid double counting, which is a result of current mixed practices.<sup>20</sup> The legislation on the disclosure of the residual mix will make it possible to revert to a Nordic disclosure at a later date, if needed.<sup>21</sup>

## 4.2 Industry associations and suppliers

Swedenergy has so far recommended the use of a Nordic level residual mix for electricity.<sup>22</sup> The motivation for this is that the electricity wholesale market can be seen as Nordic. Swedenergy sees that the main things to be considered are reliability and transparency of the reporting.

Finnish Energy Industries association strongly believes that the Nordic residual mix calculation would be the right approach as the Nordic market is already very integrated. A strong argument in favour of the Nordic alternative is also that there will most likely be a common Nordic retail market. The Nordic approach is seen to lead to the need to harmonise calculation practices and would thus lead to more reliable and transparent disclosure. Finnish Energy Industries would like tracking with guarantees of origin to also include other production than renewable energy in order to eliminate double counting of this production as well.

The arguments by these industry associations focus mainly on reliability and transparency. The Nordic approach is seen to reflect the integrated nature of the market and is thus seen to give a more correct picture of the market to consumers.

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<sup>17</sup> Ursprungsmärkning av el, EIR-2011/10

<sup>18</sup> Särskilt yttrande om samråd av Energimarkandsinspektionens rapport om en ny vägledning angående ursprungsmärkning av el. dated: 26.09.2011, Energimyndigheten

<sup>19</sup> Kristin Kolseth , NVE

<sup>20</sup> This step will however not eliminate double counting as long as Sweden still uses the Nordic residual mix.

<sup>21</sup> Petteri Kuuva, Ministry of Employment and the Economy

<sup>22</sup> Svensk Energi: Vägledning angående ursprungsmärkning av el, 2011-08-29

### 4.3 End users

Suomen Elfi, an organization representing some Finnish larger energy using industrial consumers considers that Nordic residual mix is the preferred option because of the common Nordic wholesale market. Elfi considers the national mix to be a disadvantage for Finnish industrial end users because of the higher CO<sub>2</sub> emissions associated. Elfi considers that if the pressure to buy guarantees of origin in order to reduce carbon emissions increases, it could in the future lead to higher costs for industry.<sup>23</sup>

An official statement by the Finnish Forest Industry Federation on the legislation on guarantees of origin being prepared in Finland pointed out that clear and transparent calculation methodologies are needed for a national residual mix calculation if a national approach is adopted. Finnish Forestry Industry also states that recommendations are needed for what residual mixes are to be used for reporting in the interim period before a national residual mix is to be taken into use. It was also pointed out that the rules should be the same in each country. Changes in practices are seen to result in inconsistency if the reporting is changed from Nordic to national.<sup>24</sup>

Most stakeholders who have been consulted in this study consider that the key aspect to be considered is that the reporting should be reliable and that it should correctly represent the origin of electricity regardless of the result or impact on emissions. Consumers who wish to profile themselves as environmentally conscious often purchase specially labelled energy, which can be used in marketing communication.

## 5 Discussion and conclusions

### *Current situation*

The goal of the disclosure of the residual mix is that consumers should receive correct and transparent information on how their electricity is produced. The correct disclosure will enable consumers to make informed choices on what kind of electricity they want to buy. Decisions on what to buy will not be based only on price. Receiving reliable information about energy supply will increase trust in the market.

Current practices viewed on a Nordic regional level do not conform to RE-DISS Best Practice Recommendations. The recommendations make it possible to apply a regional residual mix in areas where the market is integrated, but only if all nations within the region agree on adopting the same practices. Either all countries need to agree on a common Nordic disclosure or a national approach needs to be adopted in all countries.

The Nordic countries have so far been unable to agree on common practices for disclosure of a residual mix. Current practice is that Sweden and Finland report a Nordic residual mix<sup>25</sup>, Denmark a national residual mix and Norway reports on a national level with a large part of the residual mix remaining of undisclosed origin.<sup>26</sup>

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<sup>23</sup> Suomen Elfi, statement 28.10.2011

<sup>24</sup> Finnish Forestry Industry, statement

<sup>25</sup> Finland has decided to start reporting a national residual mix in the future, but will leave the option open in the legislation to revert back to Nordic residual mix if needed.

<sup>26</sup> NVE has since the writing of this report published a national residual mix based on RE-DISS standards for both 2011 and retroactively for 2010.

This leads to double counting of renewable attributes on a Nordic level. This may decrease trust in the suppliers and the electricity market and can prevent customers from making informed choices.

### ***Market area perspective***

When the benefits of the two alternatives are weighed, the important question is whether the alternative chosen correctly represents the origin of the electricity. The Nordic market is integrated through trade in Nord Pool. Thus the electricity market area can today be viewed also as a Nordic and also increasingly European market.

The most important benefit of the Nordic regional disclosure would be that it would more correctly reflect the integrated nature of the Nordic wholesale market. Stakeholders especially in Sweden and Finland see the integrated wholesale market as a more decisive factor in weighing the solutions than for instance where the production is physically located or whether the retail market is fully integrated or not.

### ***The common Nordic retail market***

The plans to form a common Nordic retail market for electricity should also be considered when evaluating the residual mix question. In the common Nordic retail market the area can be seen as one domain, also from the customer's viewpoint. A harmonization of the retail market area will most likely require harmonization of reporting to end users in order to promote transparency and foster trust in the common market. In a common retail market, it would be clearer from the customer point of view if suppliers in the Nordic area disclose the same residual mix. It would also eliminate the need for suppliers to calculate separate disclosure statements and to calculate CO<sub>2</sub> emissions separately for each country. This will, furthermore, reduce the need to explain differences in reporting to customers.

Authorities and most stakeholders in the Nordic countries seem to agree that the use of Nordic residual mix would be preferable if a Nordic retail electricity market is established.

### ***Reliability perspective***

From a reliability perspective both the national and the Nordic alternatives can be as reliably calculated if the same data collection principles and time limits are applied. In practice, as long as nations calculate residual mixes separately some differences may remain. Choosing a regional approach may possibly accelerate the harmonization of data collection practices and time limits for reporting, thus leading to more reliable reporting<sup>27</sup>.

The need to disclose such a large part of the electricity by a residual mix would decrease if most energy sold to end users could be backed by guarantees of origin. This would entail issuing guarantees of origin also for other types of production than just renewable energy. The problems associated with the present practices and the risks of double counting of attributes would thus decrease. This view has been presented by several stakeholders.

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<sup>27</sup> This may also lead to more pressure on harmonizing explicit tracking practice (what is tracked with GOs and when they are cancelled).

### ***End user perspective***

The choice of national or Nordic residual mix may affect the emissions reported by end users. Some end-users use the CO<sub>2</sub> emissions factors associated with national or Nordic disclosure for carbon footprint calculations and environmental reporting.

Some end users may view a transition to a calculation which results in higher emissions factors as undesirable. End users may also not like a discontinuity in the data, which changing from one way of reporting to another would entail.

Some suppliers and end users may consider that it will be beneficial to have low CO<sub>2</sub> emissions for the residual mix. This could lead to lower costs for electricity as there would be less pressure to buy guarantees of origins or especially labelled energy in order to reduce CO<sub>2</sub> emissions. On the other hand reduced pressure to buy specifically labelled energy is not beneficial from the point of view of promoting investments into renewable energy.

From end users perspective the most important things should be the reliability and transparency of the reporting. The primary question to be considered is whether the Nordic area should be considered a common market area and whether reliable and transparent reporting and disclosure can be guaranteed to end users.

### ***Nordic mix***

A Nordic residual mix could be a good solution, because common rules would, in practice need to be followed by all Nordic countries and the countries would need to use the same calculation methods. The Nordic mix would also more correctly reflect the integrated nature of the wholesale market. The regulatory authorities in the Nordic countries seem to agree that on the longer term, as the Nordic retail market is integrated, the Nordic residual mix would be the preferred solution.

### ***National residual mix***

A question to be evaluated when weighing the benefits and drawbacks of each solution is to take in to account the current situation where mixed practices are applied. Even though a country may see benefits in continuing to report in the same way as before, just to guarantee continuity, it will entail as a drawback that the reporting will include double counting of renewable attributes. The double counting of attributes leads to unreliable disclosure to end users in the region.

The current practice of applying the Nordic residual mix calculations in Finland and Sweden without there being agreement of all parties involved in the region is against RE-DISS best practice recommendations and leads to double counting. If there is no agreement between the Nordic countries on applying a Nordic residual mix, both Finland and Sweden would need to revert to national level residual mix calculations for the time being to eliminate double counting.

For Sweden and Finland who have used Nordic residual mix calculations for some years, it will be a change which will lead to discontinuity in the reporting of the origin of electricity energy suppliers as well as end-users.

### ***Leave options open for change***

It would be good that legislators leave the possibility of applying a Nordic residual mix open for the future even if a national mix is applied on the short term. As all Nordic countries at present seem to agree that a Nordic residual mix would be a good solution when there is a common Nordic retail market, it would be important to leave open the possibility to change from a national to Nordic residual mix.

***Harmonise practices for reporting the origin of electricity to end users***

Even if the calculation practices are harmonised in all Nordic countries the practices for reporting the origin of electricity to end users would still need some clarification and harmonisation in the future. End users should receive the information through practical channels and in an easily understandable way.

## Appendix A – Interviewees

### **Energy associations:**

Svensk Energi, Catherine Lillo

Finnish Energy Industries Ry, Riina Heinimäki

Energi Norge, Ole Haugen, preliminary discussion only

### **Market regulators/ Issuing Bodies:**

Energimyndigheten, Sweden, Johan Karlsson

NVE, Norway, Kristin Kolseth

Energinet, Denmark, Mads Lyngby Petersen

Energy Market Authority, Finland, Mikko Heikkilä

Grexel, Markus Klimscheffskij

RE-DISS project director, AIB president, Christof Timpe

### **Energy companies or end users:**

Fortum, Anders Wickström

Din Energi, Göran Sjödin

Dong Energy, Ulrik Stridbæk

Agder Energi, Jan Atle Liodden

Norsk Hydro

### **NGOs:**

Bra Miljöval, Jesper Petersen





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