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1 Implementation of Tracking Systems

1.1 Electricity Disclosure

Electricity disclosure in Sweden is implemented by the law “Ellag - Electricity Act” (1997:857). The electricity disclosure became into force in its original form in 2005 and was updated on 1st December 2010. The competent body is the Energimarknadsinspektionen - Energy Market Inspectorate (www.energimarknadsinspektionen.se). The relevant ministry has in 21st October 2010 mandated the Energy Market Inspectorate (EI) to propose a sophisticated system for electricity disclosure in Sweden. The first outcome of this work was published in the fall of 2011: Energimarknadsinspektionen “Rapport EI R2011:10 Ursprungsmärkning av el” – Disclosure of electricity (only in Swedish)¹, and the corresponding regulation is given in EIFS 2013:6².

EI R2011:10 is a comprehensive document, created in collaboration with an extensive reference group of key energy market stakeholders. The report is based on RE-DISS Best Practice Recommendations and the calculation methodology for residual mixes follows the BPR with the exception that it is still based on the Nordic instead of the national domain.

EIFS 2013:6 mentions that electricity disclosure should be made at least at the accuracy of renewable, nuclear and fossil energy sources. However it is recommended that fossil and renewable category should be further broken down to:

- Fossil
 - oil, natural gas, coal, peat, other fossil, hydro
- Renewable
 - wind and solar, renewable waste, biomass, other renewable, nuclear.

The amount of CO₂ and radioactive waste must be included in disclosure information.

From 2012 onwards, EI has been responsible for delivering the residual mix information in Sweden (including CO₂ and radioactive waste content). The residual mix is calculated according to RE-DISS recommendations, apart from the fact that according to EIFS 2013:6, the Nordic area residual mix shall be used in Sweden.

1.1.1 Disclosure Figures

Table 1: Nordic production and residual mixes

	Renewable %	Nuclear %	Fossil %
Nordic Production Mix 2010	61,5	20,4	18,1
Nordic Residual Mix 2010	25,3	30,9	43,8
Swedish Residual Mix 2010 (not in use)	38,8	50,4	10,8
Nordic Production Mix 2011	63,4	21,4	15,2
Nordic Residual Mix 2011	22,4	34,6	43,1
Swedish Residual Mix 2011 (not in use)	46,5	45,4	8,1
Nordic Production Mix 2012	71,4	21,5	10,9

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http://www.energimarknadsinspektionen.se/Documents/Publikationer/rapporter_och_pm/Rapporter%202011/Ursprungsmarkning_av_el_%20EI%20R_2011_10.pdf

² http://www.energimarknadsinspektionen.se/Documents/Publikationer/foreskrifter/EI/EIFS_2013_6.pdf



	Renewable %	Nuclear %	Fossil %
Nordic Residual Mix 2012	28,4	38,2	33,4
Swedish Residual Mix 2012 (not in use)	38,3	57,0	4,7
Nordic Production Mix 2013	65,0	22,6	12,4
Nordic Residual Mix 2013	9,5	35,4	55,1
Swedish Residual Mix 2013 (not in use)	2,6	71,3	26,1
Nordic Production Mix 2014	68,9	21,8	9,3
Nordic Residual Mix 2014	14,1	44,0	41,9
Swedish Residual Mix 2014 (not in use)	20,1	73,15	6,8

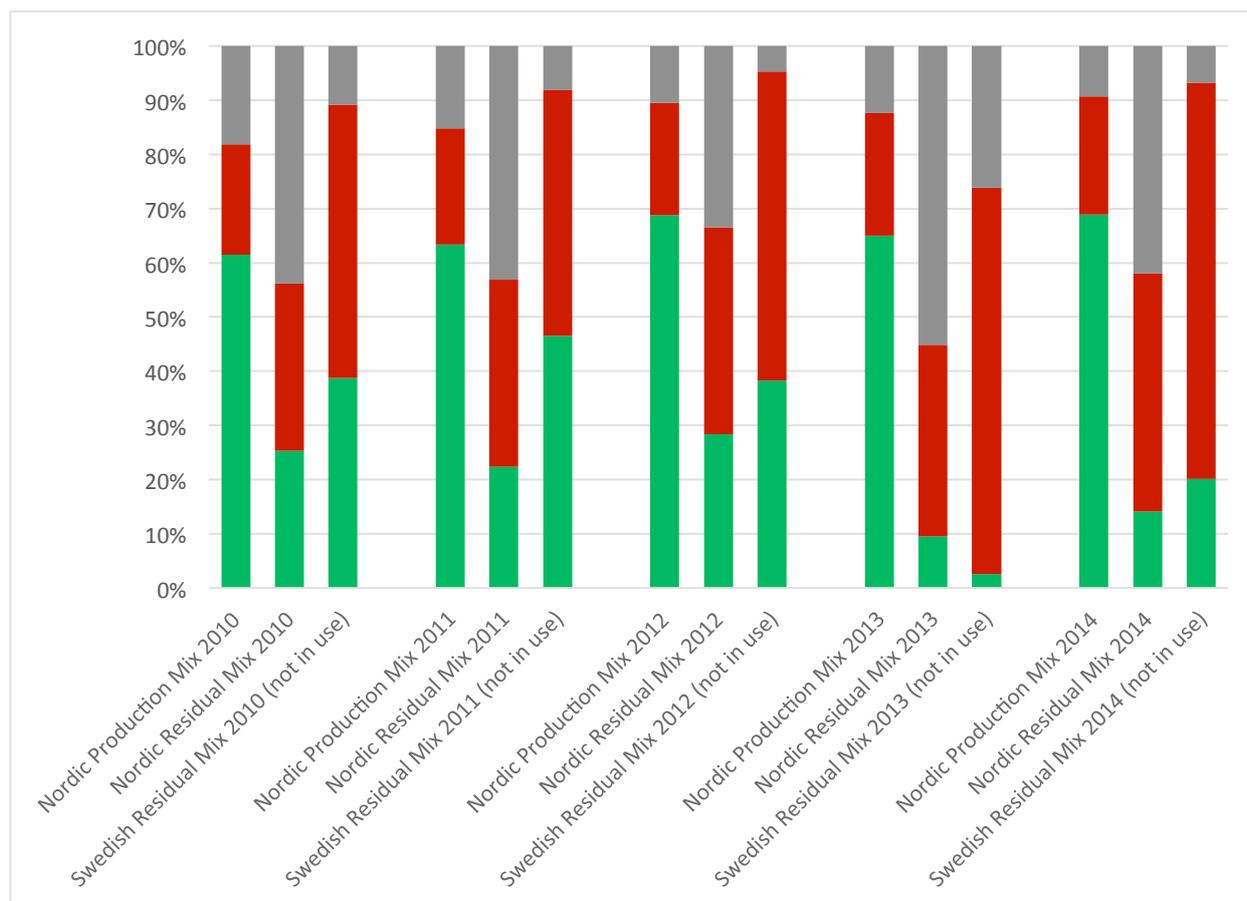


Figure 1 Nordic and Swedish production and residual mixes

1.1.2 Environmental Information

EIFS 2013:6 requires electricity suppliers to disclose to their customers the content of CO₂ (g/kWh) and radioactive waste (mg/kWh) in the sold electricity.

Table 2: Environmental Indicators

	CO ₂ (g/kWh)	Radioactive fuel (mg/kWh)
Nordic Production Mix 2011	98,5	0,64
Nordic Residual mix 2011	292,7	1,04
Swedish Residual Mix 2011 (not in use)	32,1	1,36
Nordic Production Mix 2012	76,3	0,62

	CO2 (g/kWh)	Radioactive fuel (mg/kWh)
Nordic Residual Mix 2012	258,3	1,20
Swedish Residual Mix 2012 (not in use)	37,5	1,71
Nordic Production Mix 2013	95,5	0,68
Nordic Residual Mix 2013	483,4	1,06
Swedish Residual Mix 2013 (not in use)	228,7	2,14
Nordic Production Mix 2014	61,5	0,61
Nordic Residual Mix 2014	344,5	1,23
Swedish Residual Mix 2014 (not in use)	36,2	2

1.1.3 Suppliers Fuel-Mix Calculations

Electricity disclosure is based on calendar years and cancellations of GOs relating to disclosure of year X need to be made by 31.3.X+1 the latest. Suppliers are required to present their previous year total fuel mix, at July 1st latest in the form of a circle diagram. Product-specific mixes are not required. Disclosure of any energy source is only possible through cancelled guarantees of origin or through the residual mix. This means suppliers may cancel GOs from all energy sources and the remaining energy origin is taken from the residual mix.

During 1.1.X-31.3.X, GOs may be cancelled for electricity disclosure of either year X-1 or X, and after this, only for year X.

1.1.4 Acceptance of GOs

Sweden must recognise guarantees of origin issued by other EU or EEA Member States. Sweden may refuse to recognise guarantees of origin issued by other EU or EEA Member States if it has reasons to doubt its accuracy. Such decision is to be notified to the Commission. So far, Sweden has not developed any specific regulation for assessing the reliability of foreign GOs.

1.2 Guarantees of Origin for Electricity from Renewable Energy Sources and High-Efficient Cogeneration

The guarantee of origin system in Sweden according to the directive 2009/28/EC is set forth by primary law "Lag om ursprungsgarantier för el - Act on guarantees of origin for electricity" (SFS 2010:601) and in secondary legislation by the government decree "Förordning om ursprungsgarantier för el - Decree on guarantee of origin for Electricity" (SFS 2010:853). The regulation entered into force on December 1st 2010.

Competent Body for GOs is the Swedish Energy Agency (EM) www.energimyndigheten.se. The Competent Body is responsible for e.g. monitoring the implementation of the law, registering of production devices, determining to whom and according to which detailed rules the GOs are issued and making decisions on compliance issues as well as for providing the central registry for GO e.g. issuance, transfer and cancellation.

GOs are issued for monthly production and can be issued for electricity production from any energy source (not only renewable), which further enhances the reliability of disclosure. There can be only one GO per unit of electricity produced, so both RES-GO and CHP-GO are in the same electronic document and they cannot be separated.

Guarantees of origin in Sweden are issued in the national GO system (SE-GO), which is not EECS compliant. For 2014 production, approximately 146 TWh SE-GOs were issued; of which 81,4 TWh was RES, 62,3 NUC and 1.94 FOS. Although issuing is not obligatory, the issuing volume represents roughly 95 % of all national electricity production. Also the share of cancelled GOs versus total electricity consumption is considerably high (between 70-95% during the recent years) although no obligation to use GOs exists. The central registry and statistics for Swedish national guarantees of origin can be found at: cesar.energimyndigheten.se.

The expiry of GOs in Sweden used is set 12 months after the end of the production period of the GO (http://ei.se/Documents/Publikationer/foreskrifter/EI/EI_foreskrifter_om_andring_i_EI_foreskrifter_och_all_manna_rad_EIFS%202011_4_om_%20ursprungsm%C3%A4rkning_av_el_EIFS_2012_1.pdf).

Starting from 1.1.2015, the Swedish Energy Agency, Energimyndigheten, took over the issuance and of SE-GOs and responsibility of the national Cesar registry from the previous issuing body and registry keeper Svenska Kraftnät (TSO).

<https://www.energimyndigheten.se/Press/Nyheter/Ansvaret-for-kontoforing-av-elcertifikat-och-ursprungsgarantier-flyttas-till-Energimyndigheten/>

1.2.1 EECS

The EECS issuing body in Sweden is Grexel Systems Oy, a private company acting together with the Competent Body, Swedish Energy Agency (EM). The co-operation between EM, and Grexel is based on an agreement facilitating the handover of national guarantees of origin issued by EM to Grexel. Grexel uses the national GOs to issue EECS certificates. In this automatic process the original national GOs cease to exist and EECS certificates with identical data are created. In some cases, SE-GOs may be issued for gross production, in which case a correction factor is applied before the SE-GO is converted into EECS-GO. These SE-GOs, which are “exported to EECS” can be used for disclosure in Sweden or exported to other EECS countries through the AIB Hub. For example in 2014, 22,6 TWh (all RES) of SE-GO were “exported to EECS”. However no EECS-GO can be converted into SE-GO even if this EECS-GO originated from a SE-GO.

The central registry for Swedish EECS guarantees of origin can be found at: cmo.grexel.com. Swedish EECS-GOs are widely traded and used; see Table 2. The detailed rules and procedures for guarantee of origin can be found in the Swedish domain protocol. The current version of the domain protocol can be found at AIB web page (http://www.aib-net.org/portal/page/portal/AIB_HOME/FACTS/AIB%20Members/Domain_Protocols).

Energimyndigheten is currently applying for AIB membership and will likely become the AIB member for Sweden in the course of 2016.

Table 1: GO statistics 2007-2014

	Issue (prod.)	Transfer	Export	Import	Cancel	Expiry	Export to EECS
2007	34 358 895		6 845 721	1 946 004	19 732 466		
2008	67 433 903	446 209	14 165 120	14 104 488	28 749 478		
2009	68 039 502	5 325 953	16 092 634	13 844 077	53 144 161		
2010	68 283 428	2 041 814	17 158 469	10 259 752	55 512 661		
2011 EECS		767 250	13 523 696	17 029 172	66 083 942	23 940 865	
2011 SEGO	49 817 638	11 506 460			1 133 210	457 541	13 812 695
2012 EECS		2 384 567	17 274 307	21 131 818	22 380 228	1 702 626	
2012 SEGO	144 053 436	101 515 600			27 651 900	10 846 426	18 276 905
2013 EECS		4 346 221	24 637 619	29 774 900	24 529 141	684 547	
2013 SEGO	140 709 531	127 329 090			88 732 289	44 158 924	18 224 179

	Issue (prod.)	Transfer	Export	Import	Cancel	Expiry	Export to EECS
2014 EECS		1 934 611	26 903 557	26 912 797	20 885 508	419 372	
2014 SEGO	145 588 613	128 655 287			76 728 962	40 025 229	22 633 802

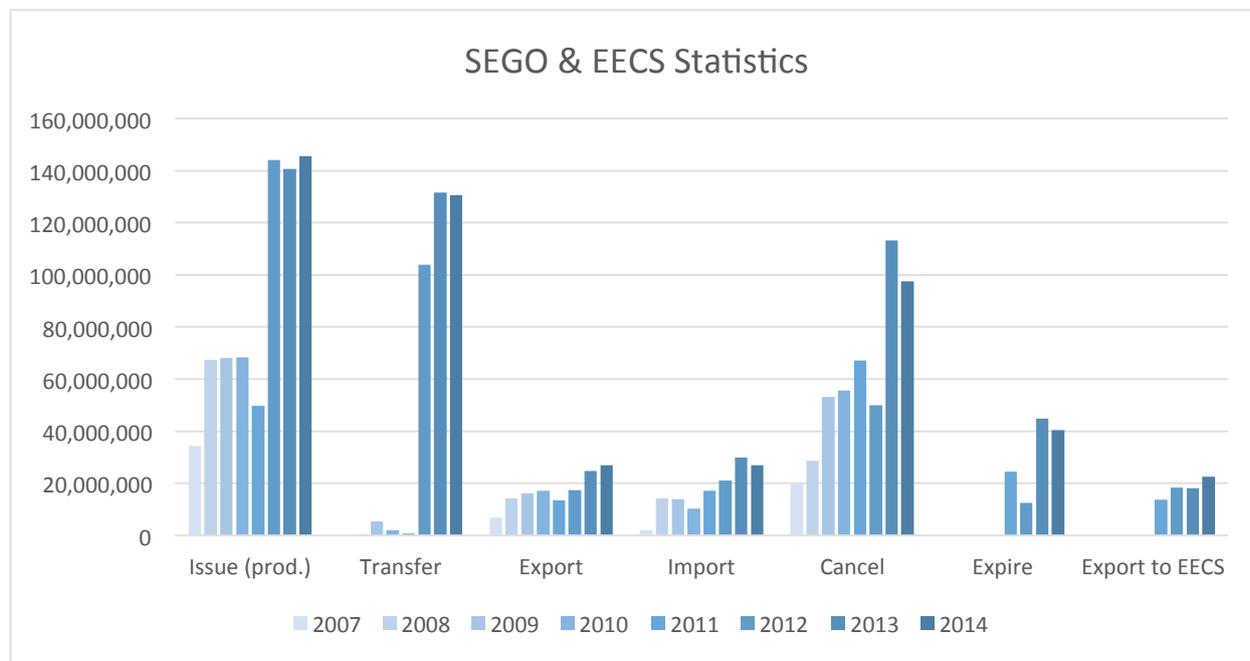


Figure 2: GO statistics 2007-2014

1.3 RES-E Support Schemes

The main support system for renewables in Sweden is a certificate based quota obligation system: Elcertificate-system. The quota is set to consumers excluding electricity intensive industries. The consumers or electricity suppliers on their behalf have to buy and cancel a certain amount of elcertificates to meet their obligation. The amount is a yearly changing share of their total electricity sales/consumption. From the beginning of 2012, Norway and Sweden formed a joint support scheme based on elcertificates. The certificates can be freely exchanged between the two countries and used for quota compliance.

Elcertificates are freely tradable and they are considered as securities in Sweden. They are purely financial instruments to allocate support and they cannot be used as a proof of origin of the electricity. The same produced energy unit receives both a guarantee of origin and an elcertificate. Statistical and price information of the elcertificate system can be found at cesar.energimyndigheten.se.

2 Proposals for Improvement of the Tracking System

Key feature of the Swedish electricity tracking and disclosure system is that GOs are the sole mechanism to sell electricity products and deviate from the residual mix, which makes Sweden a front-runner in this respect. All following proposals are made in accordance with the RE-DISS Best Practice Recommendations, which have been agreed by the Participating Domains of the RE-DISS Project.

2.1 Proposals regarding Disclosure

- BPR [19]: European countries should clarify whether and under which conditions the use of GOs by end consumers is allowed. Such GO use should not be based on ex-domain cancellations performed in other countries. If consumers are allowed to use GOs themselves, a correction

should be implemented in the disclosure scheme which compensates for any “double disclosure” of energy consumed.

- BPR [28]: As a default, the Residual Mix should be calculated on a national level. However, in case that electricity markets of several countries are closely integrated (e.g. in the Nordic region), a regional approach to the Residual Mix may be taken. This should only be done after an agreement has been concluded amongst all countries in this region which ensures a coordinated usage of the regional Residual Mix.

2.2 Proposals regarding RE-GO and CHP-GO

- BPR [7a]: Is the GO system in the country established exclusively according to EECS?
- BPR [8]: In case that not all European countries are members of EECS, appropriate connections between the EECS system and non-EECS members as well as in between different non-EECS members will need to be established. These include inter alia procedures for assessing the reliability and accuracy of the GO issued in a certain country and interfaces for the electronic transfer of GO.
- BPR [10,1]: GOs should generally be issued only for the net generation of a power plant, i.e. gross generation minus the consumption of all auxiliaries related to the process of power production. For hydro power plants involving pumped storage this means that GOs should be issued only for the net generation which can be attributed to natural inflow into the reservoir.
- BPR [13,7]: Registries should be audited on a regular basis

2.3 Proposals regarding Acceptance of GO

- BPR [20]: Any rejection should only relate to the actual use of cancelled GO for disclosure purposes in the respective country and should not restrict the transfers of GO between the registries of different countries.
 - BPR [20a]: European countries should choose one of the two following options and apply it consistently for all foreign GO :
 - Rejection of GOs only relates to the cancellation of GOs and subsequent use for disclosure purposes in the respective country and should not restrict the transfers of GOs between the registry of the considered country and the registries of their countries. This means that the decision about the recognition of a GO should not hinder its import into the considered country.
 - Rejection of GOs implies blocking their import to the national registry.
 - BPR [20b]: The choice of one or the other option should be transparent for all market parties and clearly communicated.
- BPR [21]: Within the rules set by the respective Directives, Member States should consider to reject the recognition of GO from other countries for disclosure in case that these countries have not implemented adequate measures which avoid double counting, e.g. a proper determination of a Residual Mix for disclosure

2.4 Further proposals regarding Disclosure

- BPR [39b]: Suppliers offering two or more products which are differentiated regarding the origin of the energy should be required to give product-related disclosure information to all their customers, including those which are buying the “default” product of the supplier.
- BPR [40]: There should be clear rules for the claims which suppliers of e.g. green power can make towards their consumers. There should be rules on how the “additionality” of such products can be measured (the effect which the product has on actually reducing the environmental impact of power generation), and suppliers should be required to provide to consumers the rating of each product based on these rules.
- BPR [41]: Claims made by suppliers and consumers of green or other low-carbon energy relating to carbon emissions or carbon reductions should also be regulated clearly. These regulations should avoid double counting of low-carbon energy in such claims. A decision needs to be taken

whether such claims should adequately reflect whether the energy purchased was “additional” or not.

- BPR [42]: In case that suppliers are serving final consumers in several countries rules must be developed and implemented consistently in the countries involved on whether the company disclosure mix of these suppliers should relate to all consumers or only to those in a single country.

2.5 Matrix of disclosure related problems and country-specific proposals

Problem	Country-specific proposal
Possible double counting in different explicit tracking instruments	BPRs: [7a], [8], [10,1], [13,7]
Double counting of attributes in implicit tracking mechanisms	BPRs: [21], [28]
Double counting within individual supplier's portfolio	BPRs: [39b], [42]
Loss of disclosure information	BPRs: [19]
Intransparency for consumers	BPRs: [11c], [39b], [40], [41], [42]
Leakage of attributes and/or arbitrage	BPRs: [19], [28]
Unintended market barriers	BPRs: [7a], [8], [11c], [20], [20a], [20b]

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