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Allocation scheme – calculation principles (WEEE)

Dansk Producentansvar, May 2022

DPA is short for Dansk Producentansvar (Danish Producer Responsibility). DPA oversees administrative tasks associated with the rules on producer responsibility under the Danish environmental law regarding waste from electrical and electronic equipment, end-of-life batteries and accumulators, and end-of-life vehicles.

The producer responsibility for these waste types has authority in the Danish Environmental Protection Act. This Act translates into three Statutory Orders for the different waste types: the WEEE Order, the Battery Order, and the End-of-life Vehicles Order (the current statutory texts can be found on www.producentansvar.dk.

The Danish Statutory Orders take offset in three EU directives for the same waste types: the so-called WEEE Directive, the Batteries Directive, and the ELV Directive. Also, these directives with exact titles and dates can be found on www.producentansvar.dk.

Producer responsibility rests on the principle that each producer or importer assumes responsibility for collection and management of WEEE, waste batteries, and end-of-life vehicles to the effect that products becoming waste are managed in an environmentally correct manner, with the highest possible utilisation of resources contained in such products.

Producers and importers are in the following referred to as producers as the rules applying to both types are the same.

In general, the following abbreviations are used: WEEE for waste electrical and electronic equipment, BAT for batteries and accumulators, and ELV for end-of-life vehicles.

Content

In pursuance of the rules on producer responsibility for waste electrical and electronic equipment (EEE), this document describes procedures and formulas used in DPA to calculate the share of WEEE allocated to each producer. The distribution of equipment from households is referred to as "the allocation scheme".

The allocation scheme

Pursuant to the WEEE Order, producers of equipment for use in households shall take back a proportionate share of WEEE from households.

The following principles apply to the allocation:

- WEEE allocated to producers must correspond to the product categories that he places on the market
- The producer can choose to affiliate to a collective scheme that assumes administrative and practical tasks associated with take-back.

WEEE from households is normally collected in the following ways:

1. Through municipal collection sites
2. Through collection sites established by the collective schemes
3. Through collection organised by an individual producer.

The allocation scheme only covers allocation of the municipal collection sites. Thus, DPA only allocates collection sites registered with DPA. However, all 3 collection channels above are included in the statement of the total quantities taken back.

Allocation period

An allocation period runs for twelve months – from 1 September to 31 August. A producer having been allocated an area must in the entire period collect all WEEE deriving from the allocated fraction(s) in the area.

Establishment of municipal collection sites

Municipal collection sites are established by the local authorities and operated by individual local authorities or intermunicipal waste management companies. Collection sites receive WEEE from households in all ten categories. At the municipal collection sites, WEEE categories are separated into six fractions pursuant to the WEEE Order as stipulated in the below table:

Six fractions of the WEEE Order

1	2	3	4	5	6
Large household appliances	**Refrigeration equipment**	**Small household appliances**	**Screens and monitors**	**Light sources**	**Photovoltaic panels**

The producers pick up WEEE from the collection sites when it has been separated into the six fractions. The local authorities register their collection sites on the DPA website. The local authorities decide the number of collection sites on their territory. Registered collection sites can be found on the DPA website www.producentansvar.dk.

Producer share of WEEE

The producers must take back their proportionate share of WEEE from the municipal collection sites. To allow for calculation of producers' share of WEEE, the producers report annually to DPA quantities of EEE per category placed on the market. Figures used are figures from producers' reports for the previous calendar year.

For producers entering the market before 1 April in a category where end-users are households, the allocation is based on budget figures. No post-adjustment is made for deviations between budget figures and realised sales.

The calculation is made as follows[1].

Producer market share per category:

$$P_{\%} = (MM_p / MM_{DK})$$

(Producer quantity placed on the market / Total quantity placed on the market in Denmark).

Based on reported quantities placed on the market with a deduction of reported re-exported quantities, DPA calculates the producer's market shares of WEEE to be collected for each of the six WEEE fractions to which the categories belong.

Total expected quantity of WEEE of the year is calculated with the following formula:

$$S_{WEEE} = (TM_{DK} * k_{dev})$$

(Quantity of WEEE taken back and registered in the producer register as per 1 April * expected developments in quantities of WEEE for the subsequent year compared with the preceding year).

The Environmental Protection Agency determines and informs DPA of expected developments in quantities of WEEE (k_{dev})

Producer's allocated share of WEEE for the subsequent period without regard to post-adjustment is:

$$t_p = (P_{\%} * S_{WEEE})$$

(Producer's market share of quantity placed on the market * expected quantity of WEEE).

Market shares are used as the distributional key in the distribution of WEEE to be collected in the subsequent period.

[1] Note: description of symbols can be found in Appendix 1.

Post-adjustments further to the allocation method

Based on the data registered in the producer register of DPA as per 1 April, the producer is allocated with WEEE for a subsequent period of 12 months. Due to the periodic and future-oriented nature of the allocation, it may be necessary to post-adjust for the following issues:

Symbol	Description
$E_{\pm}$	Post-adjustment for excess/deficient collection. Compensation for the fact that the collection sites allocated to the producer in the preceding allocation period did not supply the expected quantity of WEEE (excess/deficient collection).
E_{new}	Post-adjustment for producers entering the market after 1 April. Post-adjustment for producers not entering the market and registering with DPA until after 1 April and therefore not included in this year's allocation.
E_{free}	Post-adjustment for free-rider quantities. Post-adjustment for producers having noticed after the introduction of the producer responsibility system that they are subject to producer responsibility and have been so also in previous years without being registered. Such producers are called free-riders.

$E_{\pm}$ Post-adjustment for excess/deficient collection.

This post-adjustment has been established to compensate for the deviation arising from the fact that at the start of the year future quantities of WEEE *are not* known. This post-adjustment consists in an adjustment for the deviation between the market share of WEEE allocated to the producer and the quantity of WEEE taken back by the producer in the preceding calendar year. This deviation is included in the subsequent allocation period.

If a producer has taken back more WEEE than his allocated share, the excess quantity is deducted in the subsequent period. Correspondingly, a producer having taken back a smaller quantity than his allocated share, will see the deficient quantity of WEEE added in the subsequent allocation period.

Excess/deficient collection in a preceding calendar year is calculated as follows:

$$E_{\pm} = ((T_{p-1} * TM_{DK}) - TM_p)$$

(Quantity allocated to the producer in the preceding period) – quantity taken back by the producer in the preceding period).

E_{new} Post-adjustment for producers entering the market after 1 April.

The post-adjustment applies to new producers registering in the course of an allocation period and thereby not submitting data for calculation of the current allocation scheme – i.e. annually after 1 April.

Such producers are adjusted according to the following principle:

The producer should have been allocated with collection of WEEE for the year the producer entered the market. In practice, this is not possible since the allocation has already been calculated. In the subsequent period the producer is therefore allocated both for the subsequent new period and for the preceding period in which he did not participate. Since the realised quantity is now known, the outstanding allocation period is calculated with the realised quantity.

In practice, this is calculated using the following formula:

$$E_{new} = (2*MM_p)$$

(2 * quantity placed on the market by the producer).

$\mathbf{E_{free}}$ Post-adjustment for free-rider quantities.

The Environmental Protection Agency has decided that producers must assume their producer responsibility retrospectively if they were not registered in due time. This is done by registering deficient quantities in the statutory DPA register.

In practice, this is calculated using the following formula:

$$E_{free} = (\sum_{deficit\ year} MM_p)$$

(Sum of producer's historical quantities placed on the market that should have been, but have not yet been, included in an allocation).

Post-adjustment for incorrect and/or deficient registrations

Inaccuracies in quantity data reported for producers during the three months of the annual reporting period.

Symbol	Description
$F\pm_{errorMM}$	Errors in already registered quantities placed on the market, including deduction of re-exported quantities not registered previously
$F\pm_{errorTMprod}$	Errors in already registered quantities taken back by the producer
$F\pm_{errorTMcoll}$.	Errors in already registered quantities collected by the collective scheme

Post-adjustment due to errors in registered quantities placed on the market is based on the quantity placed on the market used for calculation of the allocation.

Post-adjustment due to errors in registered quantities taken back is based on the quantity taken back used for calculation of post-adjustment for excess/deficient collection.

$F_{\pm errorMM}$ Errors in already registered quantities placed on the market

A producer may find that he has registered too large or too low quantities placed on the market, or that a later re-export of some of the quantities placed on the market has taken place.

In practice, this is calculated using the following formula:

$$F_{\pm errorMM} = (MM_{p(error\ quantity)} - MM_{p(correct\ quantity)})$$

(First registered, but incorrect quantity placed on the market – the now correct registered quantity placed on the market) = (difference that should either be added or deducted from the allocation of WEEE to the producer in the subsequent period).

$F\pm_{errorTMprod}$ *and* $F\pm_{errorTMcoll}$. Errors in quantities already taken back by the producer or his collective scheme

The producer has the right to establish his own collection of WEEE and must be credited for this quantity. If incorrect registrations have been made of quantities taken back or the producer has forgotten to register his own collection of WEEE, a post-adjustment is calculated using the following formula:

$$F_{\pm errorTM} = (TM_{p(error\ quantity)} - TM_{p(correct\ quantity)})$$

(First registered, but incorrect quantity of own collection) – (the now correct registered quantity of own collection) = (difference that should either be added or deducted from the allocation of WEEE to the producer in the subsequent period).

The producer may choose to affiliate to a collective scheme for collection of all WEEE or parts of it. If the collective scheme collects WEEE for the producer, he must be credited with this quantity. This is calculated in the post-adjustment for excess/deficient collection (**$E_{\pm}$**). If the collective scheme has made an incorrect registration of the share of WEEE that it has collected on behalf of the producer, this is adjusted with the following formula:

$$F\pm_{errorTMcoll} = (TM_{p(error\ quantity)} - TM_{p(correct\ quantity)})$$

(First registered, but incorrect value for collected quantity through collective scheme) – (the now correct registered value for collected quantity through collective scheme) = (difference that should either be added or deducted from the allocation of WEEE to the producer in the subsequent period through the collective scheme).

Allocation including post-adjustment and adjustment for errors in previous years' reports

Allocation including post-adjustment, adjustment for errors in quantities placed on the market and errors in quantities taken back is calculated using the following formula:

$$T_p = (t_p + E + F)$$

= (allocation without post-adjustment + post-adjustment + adjustment for incorrect registration).

$$= (t_p + E_{new} + E_{free} + F_{\pm errorMM} + E_{\pm} + F_{\pm errorTMprod} + F_{\pm errorTMcoll})$$

$$(((MM_p) + (\sum_{deficit\ year} MM_p) + (MM_{p(error\ quantity)} - MM_{p(correct\ quantity)})) / MM_{DK}) * (TM_{DK} * k_{dev}) + ((T_{p-1} * TM_{DK}) - TM_p) + (TM_{p(error\ quantity)prod} - TM_{p(correct\ quantity)prod}) + (TM_{p(error\ quantity)coll.} - TM_{p(correct\ quantity)coll.}),$$

Where $(MM_p) = (2*MM_p)$ if allocation is calculated for a producer having registered for the category after 1 April of the preceding year.

Note that no post-adjustment is made for incorrect registrations or for re-exported quantities for periods more than two calendar years back.

Allocation of collection points

It cannot be known in advance how large quantities of WEEE the local authorities collect at their collection sites. Therefore the allocation is based on estimated quantities. DPA calculates an expected quantity of WEEE for each of the municipalities and thereby for all registered collection sites in the municipality.

The expected quantity of WEEE per municipality is calculated by taking the average of municipalities' total collected quantities for the latest three years, dividing it with the average number of inhabitants for the past three years:

Municipality's expected quantity of WEEE (a 3-year average) =

(collected quantity for year-1 + collected quantity for year-2 + collected quantity for year-3) / 3

Municipality's number of inhabitants (a 3-year average) =

(Municipality's number of inhabitants for year-1 + municipality's number of inhabitants for year-2

(Municipality's number of inhabitants for year-3) / 3

The calculation of kilograms per inhabitant for the municipality is as follows:

Kg per inhabitant = (Municipality's expected quantity of WEEE / inhabitants in municipality)

Each local authority thereby gets an estimated quantity of WEEE for allocation:

(Present inhabitants in municipality * Kg per capita).

Once this calculation has been made, DPA allocates the different areas and associated collection sites to the producers in proportion to their market share for each fraction. For this purpose, the so-called sharing key[2] is used. Areas will be one or more neighbouring municipalities.

Allocation of the different collection sites takes place per fraction. This is necessary since producers' market shares typically vary from fraction to fraction (are not the same across the fractions). The result may thus be

[2] See more on sharing key in Appendix 2: Allocation – Sharing key from category to fraction

that several producers or collective schemes are allocated the same collection site, but with the responsibility for each of their fraction. In a few cases, this means that there may be six different producers with the responsibility for collecting WEEE from each of their fraction at the same collection site.

Establishment of new collection sites in the allocation period

If new collection sites are established in an area in the allocation period, the producer or the collective scheme responsible for one or more fractions in the area must collect the same fractions from the new collection sites.

Appendix 1: Symbol descriptions

Symbol	Description	Unit
S_{WEEE}	Expected quantity of WEEE in the subsequent year	Kg WEEE per category
T_p	Allocated share of the subsequent period's WEEE incl. post-adjustment	Kg WEEE per category
t_p	Allocated share of den subsequent period's WEEE without post-adjustment	Kg WEEE per category
$P_{\%}$	Producer's market share of total quantity placed on the market	% per category
$E_{\pm}$	Post-adjustment for excess/deficient collection in the preceding calendar year	Kg WEEE per category
E_{new}	Post-adjustment for producer entering the market after 1 April in preceding calendar year	Kg marketed product per category
E_{free}	Post-adjustment for producer wishing to assume producer responsibility retrospectively	Kg marketed product per category
$F\pm_{errorMM}$	Errors in already registered quantities placed on the market	Kg marketed product per category
$F\pm_{errorTMprod}$	Errors in already registered quantities taken back by the producer	Kg taken back per category
$F\pm_{errorTMcoll.}$	Errors in already registered quantities collected by the collective scheme	Kg taken back per category
MM_{DK}	Total quantity placed on the market in Denmark in the preceding calendar year	Kg marketed product per category
TM_{DK}	Total quantity of WEEE taken back in Denmark in the preceding calendar year	Kg WEEE per category
MM_p	Quantity placed on the market by producer in the preceding calendar year	Kg marketed product per category
TM_p	Quantity taken back by producer in the preceding calendar year	Kg WEEE per category

k_{dev}	Developments in WEEE quantities. Established by the Environmental Protection Agency	% per category
$\sum_{deficit\ year} MM_p$	Sum of quantities for each of the years for which the producer has not assumed his producer responsibility	Kg marketed product per category
T_{p-1}	Producer's market share for calculation of allocated waste quantity in the preceding allocation period	% per category

Appendix 2: Sharing key from category to fraction

Sharing key

Category	Fraction 1	Fraction 2	Fraction 3	Fraction 4	Fraction 5	Fraction 6	Total
1. Large household appliances	59%	41%					100%
2. Small household appliances			100%				100%
3. IT and telecommunications equipment			77%	23%			100%
4.a Consumer equipment			47%	53%			100%
4.b Photovoltaic panels						100%	100%
5.a Luminaries			100%				100%
5.b Light sources					100%		100%
6. Electrical and electronic tools			100%				100%
7. Toys, leisure and sports equipment			98%	2%			100%
8. Medical devices			100%				100%
9. Monitoring and control instruments			100%				100%
10. Automatic dispensers			100%				100%
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