



Weight Conversion Factors for Rechargeable Batteries

Consultation Report

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Table of contents

Introduction and context	3
About the Authority	3
Principles for public consultation	3
Process for Developing the Weight Conversion Factors	4
Consultation process	4
What we heard	5
Conclusion	8

Introduction and context

In June 2020, the Authority consulted on the development of weight conversion factors to calculate the weight of rechargeable batteries.

These weight conversion factors would be used by rechargeable battery producers when meeting their reporting requirements under Ontario's [Batteries Regulation](#). Rechargeable battery producers would have the choice to report the weight of batteries they supplied into Ontario using the actual weight or using the weight conversion factors to do a unit-to-weight conversion.

The final conversion factors is included in the Authority's [Registry Procedure – Verification and Audit for Batteries](#).

Questions about this report can be emailed to: consultations@rpra.ca.

About the Authority

The Authority was established by the Government of Ontario in November 2016 as the regulator responsible for enforcing the requirements of the [Waste Diversion Transition Act, 2016 \(WTDA\)](#) and the [Resource Recovery and Circular Economy Act, 2016 \(RRCEA\)](#) and their associated regulations.

Under the WDTA, the Authority is responsible for overseeing the ongoing operations of the waste diversion programs continued under the WDTA and the industry funding organizations and industry stewardship organizations responsible for operating them. The Authority is also responsible for overseeing the eventual wind up of the industry funding organizations and their programs.

The RRCEA outlines the individual producer responsibility (IPR) regulatory framework for the collection and management of designated materials. IPR requires producers to be operationally and financially responsible and accountable for the products and packaging they sell into Ontario's market when consumers are finished using them.

Principles for public consultation

The Authority's consultations are guided by the following best practice principles developed by the Organization for Economic Cooperation and Development:

Inclusiveness and openness: *Engage broadly with a wide variety of stakeholders, provide clear and understandable information, and make the consultation process accessible, comprehensible and responsive.*

Timeliness: *Engage stakeholders early before decisions are made and provide regular opportunities for engagement on key program and policy matters.*

Accessible and cost effective: Consider a variety of tools and methods to gather feedback that promote efficient and cost-effective consultations.

Balance: Provide opportunities for diverse perspectives and opinions to be heard and considered.

Transparent: Record feedback, report back a summary to stakeholders, and synthesize feedback into programs and policies as appropriate.

Evaluation: Demonstrate the impact of public consultations on program delivery and policy development.

Process for Developing the Weight Conversion Factors

The Authority worked with a research team from the United Nations Institute for Training and Research (UNITAR) to develop the draft weight conversion factors. The team has extensive experience in waste statistics, particularly around e-waste and e-waste components such as batteries.

The researchers carried out three steps to develop draft weight conversion factors:

- 1. Classification of all rechargeable batteries**, including loose rechargeable batteries and replacement batteries for rechargeable batteries embedded within or sold with electronic products. Batteries were classified by chemistry, size, and application.
- 2. Development of weight conversion factors by size**, using desktop research to compile a comprehensive list of average weights by battery size (including the casing/housing). For most battery chemistries, standard sizes and average weights from different data sources were found to be comparable and consistent.
- 3. Development of weight conversion factors by application**, where the average weight of secondary batteries by application (g/unit) was obtained by dividing the average energy usage per application (Wh/unit) by the average energy flow per grams of battery (Wh/g). Calculated weight for battery casings were then added to the battery weight. The average weight by application were validated by comparing them to a sample of batteries in the marketplace.

The findings of the research team were presented in a [draft report](#) and posted to the Authority's website for feedback.

Consultation process

The Authority emailed its list of current MHSW program stewards and additional batteries stakeholders to give notice of the consultation. The consultation notice was also included in the June 2020 monthly newsletter.

A [dedicated page](#) on the Authority's website was created to provide detailed information about the development of the weight conversion factors for rechargeable batteries and related consultation materials.

Stakeholders were invited to submit feedback during a consultation webinar held June 2 or by email to consultations@rpra.ca on or before June 23, 2020.

What we heard

The Authority hosted a consultation webinar on June 2, 2020. Of the 102 stakeholders who registered, 76 attended the session. These stakeholders represented battery and electronics producers and retailers, processors and producer responsibility organizations, industry associations and municipalities.

The Authority's Registrar, Pat Moran, led the session, with the research team from UNITAR available to answer technical questions. The presentation slides and recording can be found [here](#).

Below is a list of all questions received during the webinar and the Authority's response. The questions have been edited for clarity and accuracy. Questions not relevant to this consultation have been excluded.

Question	Response
In the past, we have reported battery weight as total battery weight. Why would we need an adder for casing?	You do not require an adder for the casing. The researchers needed to account for the weight of the battery casing in their methodology to determine weight conversion factors for rechargeable batteries. The total weight of the battery is comprised of the weight of the casing as well as the chemistry of the battery. There are two kinds of batteries being considered here, those of standard size (such as AA, AAA) and non-standard (such as power tools), for the non-standard size battery we needed to come up with an average battery weight and with includes a casing weight. Reporting to the Authority will be of total battery weight.
As for methods, our methodology is pretty simple - we measure it. We don't care about Wh/gram or anything. Why complicate it so much?	The Wh/g was part of the methodology used by the researchers to determine weight conversion factors for rechargeable batteries. The methodology was used to produce a number which is the weight conversion factor. Each producer can choose whether they use the weight conversion factors, or report using the actual weight of their batteries supplied.
What is meant by the casing or housing of the battery?	The casing is the shell or the outside of the battery which contains the chemistry of the battery. The battery weight under the regulation is the entire weight of the battery which includes the casing and the chemistry of the battery. The casing makes up some of the materials recovered as part of the battery recovery process and it is therefore important component of the total weight of the battery unit.
Will there be a conversion factor for power banks?	Yes, there is. Please see the proposed rechargeable battery weight conversion table, power banks are included in the application "Other Portable".

Question	Response
Will reporting be by chemistry?	No, batteries will be reported in two categories, single-use (primary) batteries and rechargeable batteries that were supplied into Ontario.
Li-ion pouch batteries are embedded batteries and not covered under the Batteries Regulation. Why are you including them in the weight conversion table?	To the extent that lithium pouch batteries are embedded, it is correct that they do not have to be reported under the Batteries Regulation. However, replacement batteries for those applications are part of the supply data that must be reported. Therefore, we included lithium-ion pouches in the table.
Re: auto and motorcycle industry. Are batteries found on the vehicle at time of sale included in this new program?	The Batteries Regulation applies to batteries that are 5 kg or less and are not supplied with a product. If you are selling a vehicle with a battery, the weight of that battery does not need to be reported under the Batteries Regulation. However, if a replacement battery is sold for that vehicle and it weighs 5 kg or less, it would need to be reported under the Batteries Regulation.
Only NMC for laptops? We use other chemistries as well - including lithium-ion, just like tablets.	We have added a weight conversion factor for Lithium Cobalt Oxide (LCO) laptop batteries to the rechargeable batteries weight conversion table.
Looking at your conversion factors, they seem a bit high. I just looked at our last Call2Recycle report and 80% of our laptop batteries were 100-350 grams. Consumers lately like the smaller laptops, so batteries are shrinking. Your data might be a bit outdated.	Producers have the option to report the actual weight of the obligated batteries supplied into Ontario. If actual weights are not available, producers can use the weight conversion factors to determine obligated tonnage supplied.
Are batteries for handheld devices, such as two-way radios, included in the list of weight conversion factors?	Yes, please see the proposed rechargeable battery weight conversion table, two-way radios are included in the application "Other Portable".
What kind of sample data went into the medical devices conversion factor? 2.984 kg is quite high, but medical devices is a broad category including a wide variety of devices of different sizes. For example, a digital thermometer.	The medical category is very broad and contains a large variety of products. This range from smaller to larger products was included when determining this average weight conversion factor. If you are a producer of smaller medical products and this weight is not reflective of your products, you can report using your actual weights. However, if you are a producer of a variety of medical products, this weight conversion factor may be useful for you.

Question	Response
If the battery weights were calculated from milliamp hours, could you present a range of milliamp hours for which the battery weight-conversion factor is relevant?	For those categories of batteries that were classified based on milliamp hours, we could present a range of milliamp hours for which the weight conversion factor is appropriate. We would be interested in any commentary that stakeholders have with respect to an appropriate range for these weight conversion factors.
My understanding is that the electronics regulation will include a factor for batteries. Would this not be double reporting?	No, there will not be double reporting. The Ministry is indicating that only batteries that are supplied with a product would be captured under the electronics regulation. Replacement batteries sold separately from products must be reported under the Batteries Regulation.
When reporting, will we have to state we are using weight conversions or actual weights? Are we able to "mix and match" conversion and actual?	When you report using the weight conversion factor, that will be provided to RPRA when you report. It will be important that, whatever method you choose, you are meeting the requirements for accuracy and you maintain records of how your reported weights were determined for the purpose of inspection.
If we report using the weight conversion calculator can we switch to reporting actual weights later without redoing what was already done?	There is nothing that requires you to use the same approach for determining your battery weight every year. You may use weight conversion factors for your 2018 supply data, and actual weights for your 2019 supply data. It is however important that either way you are meeting the requirements for accuracy, and that you maintain records of how your reported weights were determined for the purpose of inspection.
Is it acceptable to report either the total weight of the battery or the conversion factor? Does it have to be stated, which reporting is used?	When you go in to register and report you will be presented with a window to report the kilograms of single-use batteries supplied into Ontario and the kilograms of rechargeable batteries supplied into Ontario. The rule is that the data you enter must be accurate. If you use the weight conversion factors, the units must be accurate. It is important to keep records of how you determine the numbers that you put in as inspectors may follow-up to see how you produced your numbers. In future years there will be verification and audit requirements, which we will be consulting on at a later date.
What if my per unit battery weights are different from RPRA's weight conversion factors?	It is up to you to decide if you want to use the weight conversion factor or your actual weight. You can always report using your actual weight. Most producers have specs with the weight of their batteries, so all they need to determine is the number of units sold into Ontario to determine the total weight supplied.

Stakeholders were provided the opportunity to email their feedback and comments until June 23, 2020. The Authority did not receive any submissions via email. Following the consultation

webinar, participants were invited to complete a short feedback survey and we did not receive any responses.

Conclusion

In consideration of the feedback received from stakeholders, the research team from UNITAR produced a [final report](#). The Authority finalized the weight conversion factors for rechargeable batteries and included them in the [Registry Procedure – Verification and Audit for Batteries](#), available on the Authority’s website: <https://rpra.ca/programs/batteries/registry-resources-for-batteries/>.