

Appendix Q

Calculation Methodology

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APPENDIX Q: CALCULATION METHODOLOGY

This Appendix describes the calculations contained on the Calculations and Future Benefits pages. The Calculations page and the calculations section of the Future Benefits page are not intended for users, but are provided to keep the calculator transparent. This description is provided to give Cal Recycle staff a better understanding of the calculations that occur behind the scenes in the calculator.

Calculations on Calculations Page

Default Waste and Recycling

The calculations on the Calculations page begin in cells N6:V49 by calculating the default disposal, diversion, and generation profiles for the business. Cell P6 records the selected industry group from the General_Info page. Cells T9:V49 pull the corresponding disposal, diversion, and generation profile for that industry group from the Waste_Data page. Cells P9:R49 convert these composition profiles into tons per employee per year of each material type by multiplying the tons per employee per year (TPEPY) by the composition in each of the three profiles.

Next, the calculator adjusts the default diverted and disposed TPEPY by material type based on the user's selection of current recycling programs. Cells H10:H49 pull the diverted TPEPY from the average diversion profile in cells Q10:Q49 if the user has selected that the business has a recycling program that recycles that material. If the user has not selected the material (either in a single material or mixed material recycling program), the calculator reports 0 TPEPY diverted for that materials. Then, cells D10:D49 subtract those calculated diverted TPEPY in cells H10:H49 from the profile of default generated tons in cells R10:R49 to calculate the disposed TPEPY for each material type. The disposed TPEPYs for each material type are summed in cell D8 for a total TPEPY that includes all material types. This total TPEPY is multiplied by the number of employees from the General_Info page to calculate the total disposed tons per year, which is used as the default value in the Current_Trash page.

The calculator divides the disposed TPEPY of each material by the total disposed TPEPY to calculate the disposal profile in cells E10:E49. This profile is used as the default profile on the Current_Trash page.

The calculator also sums the diverted TPEPYs for each material type from H10:H49 in cell H8. This diverted TPEPY is multiplied by the number of employees from the General_Info page to calculate the total diverted tons in cell H5, which is used as the default value in the Current_Recycling page. The calculator divides the diverted TPEPY of each material by the total diverted TPEPY to calculate the diversion profile in cells I10:I49. The recycling calculations then must account for different recycling programs. To avoid double-counting overlapping materials in both a single material or combined material (e.g. food and yard waste, bottles and cans) and mixed recycling program, cells I54:I81 adjust mixed recycling tons for a material to 0 if there is a more than one program that could handle the material. Cells J54:I81 apportion the mixed recycling among the remaining material types. Finally, cells M54:M81 add the two categories back together and cells N54:N81 calculates the adjusted profile. If there are multiple programs, cells J10:J49 pull this adjusted profile. If not, these cells pull the original

profile from column I. The profile in column J is used as the default profile on the Current_Recycling page.

User-Adjusted Waste and Recycling

To calculate the final tons of each material, the calculator takes into account any adjustments made by the user. The calculation methodology is similar for waste and recycling.

First, in cell E6, the calculator pulls the selected disposed tons to use from the Current_Trash page. Depending on which of the four trash amount calculations methods the user selects, the calculations page draws the appropriate amount. Similarly, if the user has chosen to revise the trash makeup, the calculator will draw that new profile into the Calculations page (conversions between weight and volume profiles are addressed below). Because the materials that the user views are broader categories than those used in the background calculations, the calculator divides each broad material category into more specific material types in proportion to the default profile. If the default profile does not contain and material types in the material category, the materials are divided equally among all material types in the category. These adjusted profile calculations occur in cells F10:F49. The final disposal tons in cells G10:G49 are calculated by multiplying the adjusted disposal profile by the adjusted disposed tons. These material-specific tons are used in the calculations on the Future_Benefits page, described in the next section of Appendix Q.

The calculations for recycling begin the same way. First, in cell H6, the calculator pulls the selected diverted tons to use from the Current_Recycling page. Depending on which of the three recycling amount calculations methods the user selects, the calculations page draws the appropriate amount. If the user has chosen to revise the recycling makeup, the calculator will draw that new profile into the Calculations page (conversions between weight and volume profiles are addressed below). Because the materials that the user views are broader categories than those used in the background calculations, the calculator divides each broad material category into more specific material types in proportion to the default profile. If the default profile does not contain and material types in the material category, the materials are divided equally among all material types in the category. These adjusted profile calculations occur in cells K10:K49. The final disposal tons in cells L10:L49 are calculated by multiplying the adjusted disposal profile by the adjusted disposed tons. These material-specific tons are used in the calculations on the Future_Benefits page, described in the next section of Appendix Q.

Weight-to-Volume-to-Weight Profile Conversions

The calculator provides the user with the choice to review and change the waste and recycling composition by weight or by volume. The weight-to-volume conversions occur in cells AB10:AK50. They consist of applying the material specific density factors to the default profiles to convert them from weight to volume. If the user selects to enter a new profile by volume, the calculator also uses the density factors to convert the profile back to weight. The density factors come from the Background_Data tab and may be revised by the user.

Cost per Ton Revisions

Cells B96:E106 show the cost numbers that are used or revised in the calculator. Cell C97 matches the county selected on the General_Info page with its cost profile region. Cells D98:D106 pull the relevant default cost profile from the Background_Data page. If the user enters specific cost information on either the cost or recycling pages, cells E98:E106 show the revised cost per ton for each material.

Calculations on Future Benefits Page

Baseline Tons, Cost Savings, and Emission Reductions

To calculate the information shown in the green section of the Future Benefits table on the Future_Benefits page, the calculator draws on the final tons calculated from the Calculations page. It displays the final disposal and diversion tons. In cells AG14:AK56, the Future_Benefits page applies material specific emissions factors and cost numbers to calculate the emissions and costs that are currently saved through diversion, compared to what they would be if those materials were disposed instead. The emissions reductions in cells AH15:AH54 are summed and reported in the Future Benefits table. The cost savings in cells AK14:AK41 are also reported in the table.

Source Reduction and Recycling Benefits

After finding the benefits from current actions, the calculator determines the future tons reduced, costs saved, and emissions avoided through new actions. First, the calculator applies the percentage that the user has selected to source reduce of each material. This source reduction percentage is applied to both current recycling and current disposal to calculate the tons of material reduced from each method in cells AL14:AM56. Cells AN14:AO56 calculate the cost savings from the reduced tons in each method. The emission savings from the tons reduced from disposal are calculated in cells AP14:AR56; the savings from tons reduced from recycling are calculated in cells AS14:AU56.

Next, the calculator applies the percentage that the user has selected to recycle of each material. This recycling percentage is applied to the current disposal that remains after the material from source reduction has been removed to calculate the tons of material recycled in cells AV14:AV56. Cells AW14:AX56 calculate the cost savings from avoiding disposal and the costs of recycling. The emission savings from the tons recycled are calculated in cells AY14:BA56.

The calculator adds the tons source reduced from disposal and the tons diverted from disposal for the total tons saved from landfill. The calculator combines the cost savings and emissions results from source reduction and diversion for the Future Benefits table.

Cost Savings from Custom Rates

If the user has selected to use custom rates in the Custom_Rates page, the calculator uses those custom rates and service levels to calculate the cost savings. These specific calculations are shown in cells BF12:B056.

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