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Connecting
EcoSchools Actions to

Greenhouse Gas Emissions

November 2021

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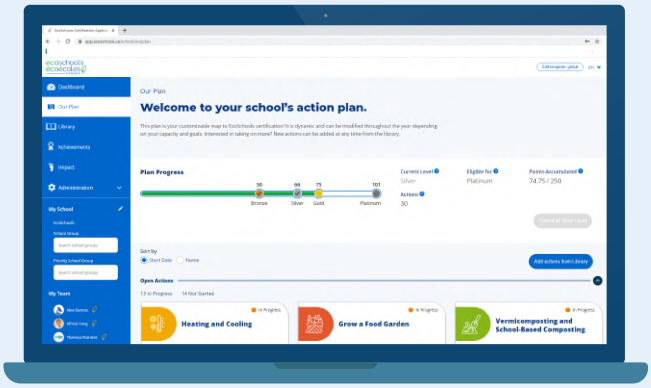
About EcoSchools Canada and Arc Skoru

EcoSchools Canada offers a certification program for K-12 schools that nurtures environmental learning and climate action. Our award-winning, curriculum-linked framework supports school communities as they assess, track, benchmark, and celebrate environmental excellence. Participation in our certification program increases student and teacher engagement, embeds environmental values into school culture, and generates tangible sustainability impacts.

We are the exclusive national operator of the EcoSchools program in Canada, and a member of the international network of EcoSchools programs, coordinated by the Foundation for Environmental Education.

Connecting EcoSchools Actions to Greenhouse Gas Emissions



The core of the EcoSchools program is the EcoSchools Certification Application (ECA), our bilingual, online application platform that enables schools across the country to create and implement a customized environmental action plan that meets the needs of their community. At the end of each year, school plans are submitted and assessed by EcoSchools staff, and schools are awarded a certification level ranging from Bronze to Platinum.

Schools across the country participate in the EcoSchools program by inputting data and answering questions related to over 45 environmental actions housed within the ECA. As a result, we are able to collect, measure, and report back on the individual and collective impact of school communities. By converting ECA data into greenhouse gas (GHG) reduction estimates, we are able to communicate data through meaningful and accessible sustainability metrics to those that participate in our program including students, teachers, board/district staff, as well as community and government partners. It also enables us to track and share a story of impact across Canada, highlighting the important work of school communities as they contribute to national and global GHG reduction targets.

GHG Report
About EcoSchools Canada and Arc Skoru

In 2020, through a partnership with the Green Business Certification and U.S. Green Building Council affiliated Arc Skoru platform, we began to convert ECA actions to GHGs. Arc is a digital tool for measuring and tracking building performance. Starting in the 2020-2021 school year, we successfully connected four actions to Arc: School Energy Footprint, School Water Footprint, Conduct a Waste Audit, and Track School Transportation Emissions. In its simplest terms, we send data to Arc for conversion and aggregation, and Arc sends it back to inform the Impact Tiles on the ECA Impact Page. Of the four actions listed, two (School Energy Footprint and Track School Transportation) are converted to carbon dioxide equivalents (CO_2e).

Our collaboration with Arc Skoru is a great start to quantifying the ECA through the lens of environmental sustainability. However, there are still many ways the ECA contributes to greenhouse gas reductions that Arc does not currently account for. Below is an overview of the ECA Impact Page, how data from the ECA informs our impact metrics, how greenhouse gas reduction estimates can be done for other ECA Actions, and areas of future growth.

The nine Impact Tiles on the ECA.

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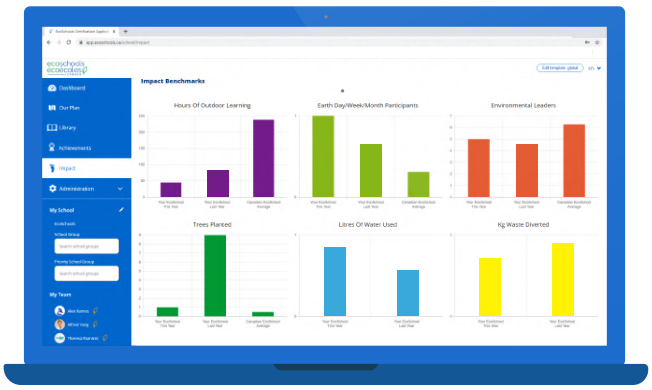
Tracking Impact: Sustainability-Focused Actions

The actions connected to Arc Skoru are showcased on the ECA's Impact Page. Here, they are represented by an Impact Tile, alongside four other sustainability-focused metrics: Hours of Outdoor Learning, Earth Day/Week/Month Participants, Number of Environmental Leaders, and Number of Trees Planted. These are calculated and aggregated from data directly from their corresponding ECA action card. See the table below for an overview of how these metrics are calculated. For the five Impact Tiles connected to Arc Skoru, see the section titled Actions Connected to Greenhouse Gas Reduction Through Arc Skoru

Impact Tile	ECA Action	Key Certification Question
Hours of Outdoor Learning	**Environmental Literacy**	**3. How many hours of outdoor learning take place throughout the school year?**
Earth Day/Week/Month Participants	**Earth Day**	**4. How many students were engaged in this action?**
Number of Environmental Leaders	**Getting Started**	**4. How many students are on your EcoTeam?**
Number of Trees Planted	**Tree Planting and Maintenance**	**8. How many new trees will be planted on your school grounds this school year?**



The Impact Page can be toggled to show metrics for an individual school or as an aggregate of all EcoSchools in Canada. When "My EcoSchool" is toggled on the Impact Page, Impact Benchmarks are given for schools. These are bar charts for each Impact Tile that compare schools' progress in the present year with their mark from the previous year, and the Canadian EcoSchools average. Year-over-year, the Impact Benchmarks will expand so schools will be able to track their progress over time.

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Actions Connected to GHG Reductions: Arc Skoru Conversions

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Energy

School Energy Footprint

By adding the School Energy Footprint action to a Plan, schools are tasked with reporting the monthly fuel and electricity usage for their school year. The key certification questions for Arc are:

8. What is the main fuel type used to heat/cool your school?

9. What fuel consumption unit is used for the fuel type selected above?

10. For the fuel type you provided, please enter the fuel consumption amount for any of the following months from this school year that you have data for

11. What is the electricity meter source at your school?

12. For the meter source you provided above, please enter the electrical consumption amount (in kWh) for your school for any of the following months from this school year that you have data for

The data from these questions is sent to Arc Skoru for conversion and aggregation, then sent back to the ECA. As a result, schools are able to see their energy usage for the school year in kilowatt hours (kWh) and carbon equivalents (CO_2e) on their individual Impact Page, and contribute to the national usage data we showcase on the National Impact Page. For this action, we strongly recommend that schools reference their fuel and energy bills or contact their board or district for exact representations of their usage. In future, we hope to be able to work with school boards/districts to automate this type of data collection, and streamline the process.

Transportation

Track School Transportation Emissions

To track the estimated CO_2e emissions coming from the types of transportation schools use to get to and from their building, schools input data into the Track School Transportation Emissions action. The key certification question in this action is:

9. What is the average distance travelled by students and staff to and from school for each mode of transport?

The data from this question is sent to Arc Skoru for conversion and aggregation, then sent back to the ECA. Schools are then able to see the approximate CO_2e from transportation consumed for the school year on their individual Impact Page and contribute their data to the National Impact Page.

GHG Report

Actions Connected to GHG Reductions: Arc Skoru Conversions

Waste

Waste Audit

To track waste diversion each year, schools complete the Conduct a Waste Audit action. The key certification questions for Arc in this action are:

11. Based on the results of your Waste Audit, how much recycling does your school generate annually (kg)?

14. Based on the results of your Waste Audit, how much organic waste does your school generate annually (kg)?

Since these questions are being reported in kilograms, data is sent to Arc Skoru only for aggregation, then sent back to the ECA. Schools are then able to see the collective kilograms of waste diverted from landfill per year on their individual Impact Page and contribute their data to the National Impact Page.

Water

School Water Footprint

School Water Footprint is used to track the amount of water schools use within a school year. The key certification questions for Arc in this action are:

8. What unit is used to measure water use at your school?

9. What is your school's monthly water consumption in the unit reported above? Please fill out as many months as you can from the school year

This action is unique in that data is being converted and aggregated by Arc Skoru, but is not being converted to CO_2e. In this circumstance, schools are able to see the amount of water used per year in litres on their individual Impact Page and contribute their data to the National Impact Page. For this action, like School Energy Footprint, we strongly recommend that schools reference their water bills or contact their school board or district for exact representations of their usage. In future, we hope to be able to work with school boards/districts to automate this type of data collection, and streamline the process.

GHG Report

Actions Connected to GHG Reductions: Additional Conversion Factors

In this section, we are providing some suggestions for how to find GHG reduction values based on data collected in other action cards that are not being converted in the ECA. This could inform a class project, or promote further investigation.

School Ground Greening

Gardening Actions

To determine the amount of CO_2e being sequestered by a school's gardens, the Grow a Food Garden and/or Pollinator Garden actions have to be completed. The key questions needed for conversion is question 8 for both actions:

8. What is the size of your food garden (in square meters)?

8. What is the size of your Pollinator Garden (in square meters)?

These actions do not connect to Arc Skoru, but their results can still be converted to carbon equivalents. By multiplying the answer to certification question 8 by 0.011737, the result gives the tons of CO_2e sequestered by the food or pollinator garden after 10 full growth cycles (Okvat & Zautra, 2011).

Tree Planting and Maintenance at School

To uncover the approximate CO_2e being sequestered from the trees that are planted or maintained on a school's grounds, the Tree Planting and Maintenance at School action must be completed. The key questions for conversion are questions 8 and 9:

8. How many new trees will be planted on your school grounds this school year?

9. How many trees will be maintained on your school grounds this school year?

The Tree Planting and Maintenance at School action does not connect to Arc, but it can still be converted to an approximate carbon offset value. Multiplying the answers to questions 8 and 9 by 0.060 gives the approximate tons of CO^2e sequestered by trees after 10 years of growth (McPherson, van Doorn, & Peper, 2016; United States Department of Energy, 1998).

GHG Report

Actions Connected to GHG Reductions: Additional Conversion Factors

Transportation

Anti-idling

To get an estimation of the amount of carbon equivalent being saved from anti-idling initiatives, schools need to complete the Anti-idling action in the ECA. Here, schools count the number of vehicles at their school that were idling before and after their anti-idling campaign. The certification questions of focus are:

8. How many vehicles did you observe idling in your PRE-action tracking?

9. How many vehicles did you observe idling in your POST-action tracking?

11. What is the annual amount of GHG emissions released by idling vehicles at your school? [kg/year]

Quantifying this action into carbon equivalents saved is unique because it is calculated using an EcoSchools Canada worksheet, which is available in the Resources section of the action card. The sheet instructs participants to count the number of each type of vehicle, idling time per vehicle, and the net vehicles stopped from idling after an anti-idling campaign. In the worksheet, these results are converted to net carbon emission savings in kilograms per year.

Waste

Divert Textile Waste Action

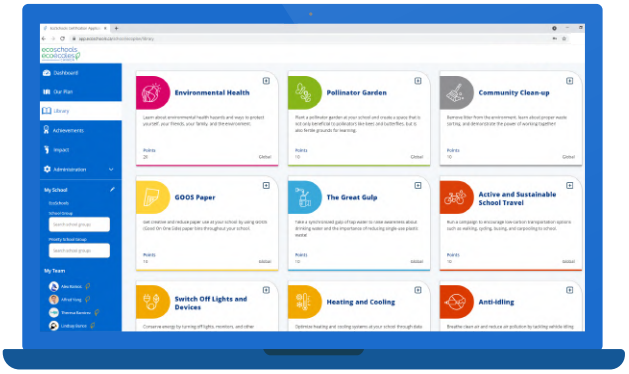
The Divert Textile Waste action is used to track the amount of textile waste that is being effectively repurposed in a school. To convert this value to CO_2e, certification question 9 needs to be answered:

9. What is the total weight (kg) of textiles diverted?

Next, the value needs to be multiplied by 0.035825 (Semba et al., 2020). The answer to this calculation is the estimated CO_2e used to create each kilogram of textiles reported. When a textile is diverted from the landfill and repurposed, it is maximizing the potential of the carbon equivalent used to create the textiles, and eliminating the need to generate more greenhouse gases to create a new product that fulfills the same purpose.

Next Steps

Outside the Actions listed above that can easily be converted to show how actions contribute to greenhouse gas reduction, the EcoSchools action library includes a number of other actions that create environmental benefit in quantitative ways. Below are two actions that we're actively researching. Outlined are their key certification questions, and their anecdotal greenhouse gas reduction benefit.



Low-Mow Zone

8. What is the size of your Low-mow Zone (in square meters)?

In this action, greenspace is allowed to grow taller, increasing the amount of CO_2 being sequestered from the area. There is also fuel savings if this area is normally mowed with a lawn mower.

Meatless Monday

8. How many students and staff wrote and submitted a Meatless Monday pledge as a result of your campaign?

9. How many families were encouraged to take a Meatless Monday pledge AT HOME as a result of your campaign?

Assuming a pledge results in a Meatless Monday for all that sign up, there is on average a carbon benefit for not including meat in meals.

McPherson, E. G., van Doorn, N. S., & Peper, P. J. (2016). Urban tree database and allometric equations. U.S. Department of Agriculture, 1-92. https://doi.org/10.2737/PSW-GTR-253

Okvat, H. A., & Zautra, A. J. (2011). Community gardening: A parsimonious path to individual, community, and environmental resilience. American Journal of Community Psychology, 47(3-4), 374-387. https://doi.org/10.1007/s10464-010-9404-z

Semba, T., Sakai, Y., Ishikawa, M., & Inaba, A. (2020). Greenhouse gas emission reductions by reusing and recycling used clothing in Japan. Sustainability, 12, 1-16. https://doi.org/10.3390/su12198214

United States Department of Energy. (1998, April). Method for calculating carbon sequestration by trees in urban and suburban settings. United States Department of Energy. https://www3.epa.gov/climatechange/Downloads/method-calculating-carbon-sequestration-trees-urban-and-suburban-settings.pdf