CASE STUDY REPORT : La Meute

JANUARY 2023

CALCULATING THE CARBON FOOTPRINT OF A QUEBEC FEATURE FILM

Study conducted with the support of
Telefilm Canada

By
Conseil québécois des événements écoresponsables (CQEER)

With the help of
Quebec Film and Television Council (QFTC)
Association québécoise de la production médiatique (AQPM)
Rolling Green

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Conseil québécois des événements écoresponsables

DISCLAIMER

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Any opinions, findings, conclusions or recommendations expressed in this document are those of the author and do not necessarily reflect the views of Telefilm Canada or the Government of Canada. The governments of Canada and their agencies are in no way bound by the recommendations contained in this document.

SUMMARY

To date, the audiovisual sector is one of the most polluting on the planet. In fact, a multi-site feature film generates 1,000 t of CO_2 equivalent, which corresponds to 10,000 round trips from Montreal to Toronto by plane. Unfortunately, there is little information on the environmental impact of the audiovisual industry in Quebec. Obtaining quantitative data on the carbon impact of a Quebec production is essential to build an argument in favour of the eco-responsibility of film sets. Provincially, few productions have calculated their carbon footprint, and no data has been made public.

The main objective of the case study of the filming of La Meute is therefore to analyze the CO_2 emissions of the various departments involved in a production in order to identify their impacts. The results can constitute an initial benchmark for other Quebec productions. In addition, this report aims to demonstrate the different steps and actions to adopt on film sets for improving their carbon footprint.

The data was collected with the help of the Quebec Council for Eco-responsible Events (CQEER), mandated to support the production in calculating the film's carbon footprint and setting up eco-responsible actions. The support was split into three main stages: pre-production support, presence during filming, carbon calculation and report writing.

Overall, **102.33 t of CO_2 equivalent** were generated by the filming of La Meute, which represents approximately **3.53 t per shooting day** for a two-hour film, or 51.16 **t per hour of content**. Those results correspond to the period from the start of pre-production to the end of post-production. For comparison, this represents approximately 350,000 km in a medium-sized car. Ranked in order of importance, here are the departments that had the most impact during the filming of La Meute: the transport department with a total of 92.89 t eq. CO_2, the materials with a total of 8.03 t eq. CO_2 and the film location department with a total of 1.26 t eq. CO_2.

SUMMARY

The calculation of La Meute's carbon footprint has enabled an entire film crew to become aware of its environmental impact and to learn lessons that can be transferred to other sets. The key to reducing greenhouse gas emissions is raising awareness of the impacts, training film crews and simplifying environmentally friendly actions, which help promote education, team commitment and the maintenance of habits. According to the producer, the presence of an advisor dedicated to eco-responsibility was essential to succeed in achieving buy-in from the team. It would therefore be appropriate for future Canadian feature film shoots to hire or appoint a resource person to proceed with the management and education of eco-responsible practices. In addition, giving a face to the eco-responsible commitment of a production makes it possible to formalize the commitment of a producer, to align it with concrete actions and to give the team confidence in the seriousness of the approach.

It should be noted that from the start of the support by the CQEER advisor, participation in the case study motivated the production team to reflect and take action to reduce the environmental footprint. The carbon footprint is therefore not entirely representative of a conventional production, but rather of a production that has made eco-responsibility efforts. It would be very interesting to study the footprint of several Quebec productions in order to have a more representative idea of the environmental impact of the industry.

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DEFINITIONS

CO_2 equivalent

The CO_2 equivalent (CO_2 eq) is a unit devised by the Intergovernmental Panel on Climate Change (IPCC) to simplify greenhouse gas (GHG) emissions calculations. Although some GHGs (methane, nitrous oxide, etc.) have a greater warming effect on the atmosphere than others (for example, methane has a warming potential 24 times higher than CO_2), the CO_2 equivalent allows for different GHGs to be reported using the same unit of measurement (*Connaissances des énergies, 2016*).

Residual materials

These are materials or objects discarded by households, industries, businesses, or institutions, which are either upcycled, recycled, reused, composted or otherwise disposed of. Wastes (or ultimate wastes) are residual materials that can neither be reused or recycled (*Government of Quebec, 2022*).

1. CONTEXT OF THE STUDY

1.1 Issues and objectives

The audiovisual industry is one of the most polluting in the world. Indeed, the Hollywood studios, located in California, pollute more than any other industry, with the exception of oil exploitation (*Lenglet, 2022*). The French collective Ecoprod estimates the footprint of the audiovisual industry at 1.7 million tonnes of carbon per year. In fact, a multi-site feature film generates 1,000 t of CO_2 equivalent,[1] which corresponds to 10,000 round trips from Montreal to Toronto by plane. According to the British carbon calculator "We are Albert" in 2019, one hour of television represents 9.2 t eq. CO_2. The good news is that this figure is 10% lower than the result obtained in 2017, namely 10.2 t eq. CO_2 (*Matthews, 2020*).

Unfortunately, there is little information regarding the environmental impact of Quebec's audiovisual industry. The carbon impact data available for filming comes mainly from France (Ecoprod) or the United States (Sustainable Production Alliance) and does not accurately reflect the reality of Quebec's film industry. Gaining quantitative data regarding the carbon impact of Quebec productions is essential to building a case for eco-responsibility on film sets. Across the province, few productions have actually calculated their carbon footprint, and no data has been made public. Therefore, there is no impact report for the Quebec industry.

Given the lack of quantitative data on the environmental impact of Quebec's audiovisual industry, the Quebec Council for Eco-responsible Events (CQEER), together with the Quebec Film and Television Council (QFTC), proposed a case study project to Telefilm Canada. This study is the first of its kind to be financed by Telefilm Canada, a Crown corporation dedicated to the success of the Canadian audiovisual industry, whose primary mandate is to foster access and excellence by providing programs that support cultural resonance and public engagement. Telefilm supports dynamic businesses and creative talent by financing and promoting these productions through its various funds and programs. The primary objective of the study is to analyze the CO_2 emissions of the different departments involved in the production process in order to assess their respective impacts. The figures were determined with the help of the We are Albert carbon calculator. These results could constitute an initial benchmark for other Quebec productions. This report compiles insights about the data collection process and presents the carbon footprint results. In addition, this report aims to demonstrate the steps and actions to adopt on film sets in order to improve their carbon footprint.

[1] *According to figures obtained from Ecoprod (France).*

CONTEXT OF THE STUDY

1.2 Collaborators

About the CQEER

Introduced by the Réseau des femmes en environnement, the Quebec Council for Eco-responsible Events (CQEER) is an information and exchange hub that fosters and promotes the organization of sustainable and eco-responsible events in Quebec. The CQEER, a non-profit organization, has provided support to more than 9,000 event organizers across Quebec since its launch in January 2008. Its objectives are as follows:

- Reduce the environmental impact of events
- Build management habits based on the sustainable development principles
- Promote responsible consumption
- Promote local impacts and stimulate societal returns
- Share available expertise
- Raise the profile of sustainable initiatives in the event industry

Although the CQEER specializes in organizing eco-responsible events, it has developed an expertise in living arts and film production through its work aimed at making the cultural sector more environmentally responsible. The CQEER is a founding partner of the Rolling Green program and a content expert partner. The CQEER is responsible for managing accreditations.

About the QFTC

The Quebec Film and Television Council (QFTC) is a non-profit organization whose mission is to contribute to the development and competitiveness of Quebec, as a world-class centre for multi-screen production. The QFTC generates investment within the Quebec region, with the support of competitive fiscal incentive programs, the expertise of network members, architectural diversity, high-quality infrastructure, and the industry's capacity to export products to foreign markets. The QFTC is one of the three founding partners of the Rolling Green program.

About Rolling Green

The Rolling Green program facilitates the adoption of eco-friendly measures for audiovisual productions in Quebec. Rolling Green offers recommended practices, tools and resources to productions, regardless of their size or type, to help them reduce their impact on the environment.

CONTEXT OF THE STUDY

About the AQPM

The Association québécoise de la production médiatique (AQPM) advises, represents and accompanies more than 160 independent film, television and Web production corporations, which represent the vast majority of Quebec companies producing or co-producing for all types of screens, in both French and English. The AQPM is a uniting partner of the Rolling Green program.

About Max Films Média Inc. (Film La Meute Inc.)

Founded in 2013, Max Films Media is a Montreal-based company whose mission is to produce films of all genres, with a strong cinematographic identity.

Max Films Média Inc. (Film La Meute Inc.)
1560 du Verger St.
Saint-Bruno-de-Montarville, Quebec
J3V 3L7

About K.O. 24 Inc.

Founded in 2012, K.O. 24 Inc. is a Quebec-based film and visual media production company. K.O. 24's mission is to entertain and move people all over the world.

K.O. 24 Inc.
651 Notre-Dame St W, suite 550
Montreal, Quebec
H3C 1H9

CONTEXT OF THE STUDY

1.3 Chosen production and selection criteria

Following several discussions and exchanges during which the producer of La Meute shared her concerns about eco-responsibility, Telefilm Canada asked this production to take part in the case study. The project is a multi-site feature film with a typical number of shooting days for the industry. The film was given a medium-sized budget for a feature film shot almost entirely outside the city. To produce this film, two production companies (Max Films Media and K.O. 24) came together under the umbrella of Film La Meute Inc. The film will be distributed in Canada by Sphere Films.

The shooting took place in four different locations, which is quite rare for a Quebec film: the Eastern Townships, the Laurentians, the Outaouais and Montreal. For all these reasons, it is an interesting case study.

Overview of the production under study

Production name	La Meute
Company	Film La Meute Inc.
Days of shooting	29
Type	Feature film

CONTEXT OF THE STUDY

1.4 Milestones and responsibilities

The CQEER's mandate was to assist the production in calculating its carbon footprint and help it set up eco-responsible actions. The assistance was split into three main steps:

Step 1 – Pre-production support

Objective: Coaching and research assistance to find eco-responsible solutions prior to the shooting, as well as other tasks to help the team improve their eco-responsibility practices.

Step 2 – Presence on set

Objective: As the set's contact person, assistance in setting up environmentally friendly actions, and data collection for the carbon footprint.

Step 3 – Carbon calculation and case study report

Objective: CO_2 emissions analysis of the main expenditure items in order to inform the production of its impacts.

These different components are detailed in the following sections. The methodology is outlined for each of the items, and the main findings, as well as the data gathered, are summarized. It must be noted that the recommendations and insights are based on the specific characteristics of the La Meute production and may not be relevant to productions with different parameters.

The case study was conducted according to the timeline shown on the next page.

CONTEXT OF THE STUDY

Project timeline

Period (2022)	Activity
May	Pre-production - Kick-off meeting
May-June	Pre-production – Interviews with various departments and follow-up meetings
July-August	Visits on set
September-November	Data entry in the “We are Albert “calculator
October	Presentation meeting at Telefilm Canada
October-November	Drafting of the report by the CQEER, and review by the QFTC and the production company
December	Report submitted to Telefilm Canada

2. DATA COLLECTION AND KEY FINDINGS

2.1 Pre-production support

These are tasks that have been accomplished during the first step of the coaching process:

- Process overview with the team
- Status update meetings
- Creation of memory aids (reminder lists) for each department
    - Distribution to each department of a list of achievable environmentally responsible actions
- Meetings with the various departments
    - Each department was met to validate its understanding of the actions. The goal was to understand each participant's reality, find solutions, and better determine the type of data that could be collected for the carbon footprint.
- Data collection planning for the carbon calculator
- Scheduling of on-set visits
- Familiarization with the "We are Albert" calculator

Suggested improvement : It would be advisable for future Canadian feature film shoots to hire or appoint a contact person to take charge of the tasks listed above and to communicate environmentally responsible practices.

2.2 Presence on set

During the initial weeks of filming, a CQEER advisor was on site every day for 2 to 10 hours. Her role was to introduce eco-responsible initiatives (sorting bins, etc.) adapted to each shooting location. Another key to achieving good practices was the transmission of good habits to the team. An advisor was present at least once at every new location, mainly to ensure compliance and answer questions from the team as required.

DATA COLLECTION AND KEY FINDINGS

During the shoot, the advisor performed the following tasks:

- Being present at lunch time to help sort residual materials.
  - In order to raise awareness and educate the team about sorting materials according to the local regulations where the shooting was taking place, emails were sent detailing the materials accepted and refused by the municipality. These emails also served as a reminder of good sorting practices (e.g. soiled cardboard should go to compost since it cannot be recycled). Given that the team members were working long days and receiving multiple emails, being present at lunchtime was crucial for understanding and assimilating good practices. The production noticed how much more difficult it was for the team to properly sort items when the contact person was not there.
- Assessment of the waste volume or the number of servings remaining after meals
- Residual materials management
  - The advisor made sure to display the signage and to group the sorting bins into clusters (making sure that no garbage bin was left out). A place to collect hazardous materials (batteries, light bulbs, etc.) was also made available.
- Requests to obtain the necessary data for the carbon calculation, both to the team and to suppliers
- Talks with suppliers (e.g. car rental, caterer) about the best way to obtain data and overview of the process
  - Raising supplier awareness of the importance of the initiative contributed to reducing the impact of their activities on the environment. For example, the stove burners used by one of the caterers were collected in a cardboard box to make them aware of their recyclability. Such items must be brought to the ecocentre to be properly recycled.
- Collaboration with the video board department
- Answering the team’s questions
- Pictures in preparation for the Rolling Green accreditation
- Weighing of materials (recycling, compost, ultimate wastes) generated after meals
- Other data gathering for the carbon footprint

DATA COLLECTION AND KEY FINDINGS

Having a person in charge of eco-responsibility on the set is a definite added value. An on-site contact person **fosters education, team engagement and habit persistence.**
According to the producer, the presence of a dedicated eco-responsibility advisor was key to achieving buy-in from the team.

2.3 Carbon calculation and case study report preparation

The third step of the mandate consisted of retrieving the remaining missing data from each department's expense reports once the shoot was over, and then compiling all the information into the carbon calculator.

The Albert calculator was used to determine greenhouse gas emissions (in tonnes of CO_2 equivalent). The methodology used to collect data is outlined for each of the following seven categories: non-filming spaces, filming spaces, travel and transport, accommodation, materials, disposal, and post-production.

2.3.1 Non-filming spaces

This category includes the support rooms and the rehearsal studio. For some non-filming spaces, when it was not practical to isolate the energy consumption data, we used the integrated benchmarks of the Albert calculator. For example, for a hotel conference room rented for the team, here are the details provided by the calculator:

- Space type: Production office
- Energy type: Electricity
- Baseline measurement: Standard air conditioning
- Number of people working at a desk: 6
- Number of days: 6
- Result = 0.00035 t of CO_2

The result uses the preceding information and the country of shooting to determine the type of energy consumption and corresponding emission factor.

DATA COLLECTION AND KEY FINDINGS

The calculator also makes it possible to enter meter readings for electricity consumption (in kilowatt-hours). For locations where the meter was accessible, we recorded the meter readings using Hydro-Québec's web resource. In the case of La Meute, we opted for this method for the support room located at the Duhamel town hall.

The readings were done either:

- At the beginning and at the end in order to cover the entire use of the site
- At the beginning and end of the day
- Over a specific time frame (over one or several hours in order to extrapolate later)

Collected data:

- The energy consumption linked to the use of support rooms
- The number of people in the production team who worked off-site, and the number of days they did so

For the person in charge of the eco-responsible component, it is useful to work with collaborators. When data collection is not possible because of scheduling conflicts, a trusted person can step in to help.

2.3.2 Filming spaces

For the filming locations, we calculated the footprint related to the use of generators. To do this, we have taken into account the propane or diesel purchases in the film crew's expense allowances. The Albert calculator has the option to enter a dollar amount or a number of litres, depending on the information available.

For indoor filming with a temporary connection, we took meter readings. This was the case for the first part of the shooting which took place in a country house in East Bolton.

DATA COLLECTION AND KEY FINDINGS

2.3.3 Travel and transport

For this component, the data collection involved several rounds of trial and error. The first attempt to retrieve the information entailed asking the shuttle drivers to give us the number of trips they made in a day and then to extrapolate the results using the total number of shooting days. This method would have resulted in inaccurate data.

For trips from the hotel to the filming site, including journeys by shuttle bus and personal vehicle, it would have been possible to extract the information from the daily move orders. The move orders were sent daily by the production coordinator and included relevant information for the carbon calculation (type of vehicle, departure and destination). At the bottom of each document, all addresses (hotel, support room, base, shooting location) were indicated.

However, this method was very time-consuming as each piece of information had to be individually compiled and the distances travelled between locations had to be estimated with Google Maps.

Compiling travel data from expense reports at the end of the shoot proved to be the most efficient way to gather transport data. Since the calculator only takes into account expenses reimbursed by the production, we went through the expense reports to separate out the fuel payments. This method makes it possible to cover the fuel costs for personal vehicles and rented vehicles (shuttles, trucks, etc.), while also taking into account the costume designer’s errands, the production assistants’ trips, the props handler’s trips, the shuttle bus trips, the equipment truck trips, etc.

Another option would have been to ask the rental company (or companies) to provide us with the following information for each rental vehicle upon return:

- Model and year
- Fuel type
- Mileage for the rental period

DATA COLLECTION AND KEY FINDINGS

Collected data:

- Distance travelled for pre-production scouting and technical visits.
  For the technical visits, a bus was hired to avoid individual travel. We therefore studied the routes to determine the distances travelled.
- Expenses related to the purchase of gas or diesel for the various equipment trucks (camera, sound, etc.) and set vehicles.
- The total fuel expenditure for the stage vehicle.
- Some service companies charge travel fees, for example, for truck security or chemical toilet delivery. These amounts have been entered in the calculator, although their impact is negligible.

Positive takeaways from this category

For travel by personal vehicle, there was an average of four passengers (including the driver) per vehicle, indicating a significant carpooling effort.

Insights

- The fuel costs for the video board department represent emissions of 27.82 t of CO_2 (out of a total of 92.89 t for the entire Travel category).
- 12 % of the total footprint for this category is related to production assistants' travelling (hotel to set shuttles, set to support room shuttles, back and forth to Montreal, etc.), which amounts to 11.24 t of CO_2.
- Technical and scouting visits accounted for 8.8 t of CO_2.
- The equipment truck footprint (sets, cameras, etc.) totalled 8.47 t of CO_2.
- The production did not hire any electric vehicles. When discussing this, the production team explained that it is difficult, or even impossible, to lease the necessary vehicles in an electric version. The CQEER witnessed this challenge on many occasions.

2.3.4 Accommodation

Collected data :

Regarding accommodation, we asked the production coordinator to provide the following information:

- Type of accommodation (budget hotel, luxury hotel, apartment, house, etc.)
- Number of rooms used
- The number of nights booked

DATA COLLECTION AND KEY FINDINGS

For each stay, these three pieces of information are sufficient to use the carbon calculator, as is the case for other cultural GHG calculators such as Creative Green and the AGÉCO and CQEER event calculator.

Positive takeaways from this category

One of the hotels used was certified ***Clé Verte***. This certification recognizes hotels that are committed to improving their environmental impact. This hotel has therefore made a number of environmentally friendly commitments.

Insights

Since Quebec's electricity generates a low carbon footprint thanks to hydroelectricity, accommodation accounts for only 0.0919 t of CO_2 equivalent.

2.3.5 Materials

This category includes food (meals), and the following materials: batteries, cardboard, glass, metal, paint, paper, plastic, textiles, wood.

Collected data:

Food

- Meals provided by caterers: we estimated the number of meals that contained pork, chicken and fish and the number of vegetarian meals.
- Meals provided by the canteen keeper: after filming ended, the canteen keeper provided us with the menu and the number of servings per day. Since the "snack" size differs from the "meal" size called for by the calculator, we counted three snacks as one meal. The following box shows the number of meals (snacks and catered meals) that were served over the entire shoot:

Vegetarian -1485 meals - 1.13 t CO_2
Chicken - 555 meals - 1.60 t CO_2
Fish - 308 meals - 0.77 t CO_2
Pork - 742 meals - 2.33 t CO_2
Beef - 62 meals - 0.61 t CO_2

DATA COLLECTION AND KEY FINDINGS

- Containers and utensils used by the canteen: we counted the boxes of utensils (made of bamboo) and containers (made of compostable cardboard) purchased by the canteen worker, obtained their weights from the supplier and then calculated the data required by the calculator.
- Glass: Number of glass bottles (alcohol, wine, beer, kombucha).

Costumes

- Dimensions and density of a piece of new fabric used for costumes. Regarding textiles, the calculator only considers new textiles, not second-hand ones. The density of the fabric and its dimensions must be entered in the calculator.
- Number of new pieces of clothing purchased for costumes, compiled in the calculator according to the type of garment (t-shirts, pants, dresses, skirts or coats) and the main material from which the item is made (silk, cotton, leather, nylon, polyester or unknown).

Sets and props

- Metal cans: using the props suppliers' invoices, among others, we calculated the number of beverage cans that were purchased.
- Set materials: on the basis of the invoices submitted to the production, we calculated the volume of wood consumed using the quantity and size of the timber. The invoices also listed paint expenses. Quantities were expressed in litres (L). In some cases, it was necessary to consult the suppliers' websites to determine the type of paint (mat, gloss, water-based or oil-based) as this information was required by the calculator. Overall, a total of 59 L of paint was used for the sets, which generated 0.125 t of CO_2.

Production office

- Paper and cardboard: we tracked the number of sheets of paper used in the production office. Based on the rental invoice for the printer, we were able to find out the total number of prints.

DATA COLLECTION AND KEY FINDINGS

Positive takeaways from this category

Reusable cups were provided with the canteen's coffee machine. There were no single-use coffee cups available on the set.

Team members were encouraged to bring their own reusable containers,[2] identified with their names, so that the canteen worker could use them to serve snacks. However, the initiative was not adopted by many. This is probably a result of the COVID-19 pandemic and the sanitary measures that were in place on the sets at the time: although the practice was well established before the pandemic, time is needed to get everyone back into the right habits. It should also be noted that the owner of the main filming location did not allow the crew to use the well water, which made it difficult to wash the containers.

Insights

This category constitutes the second-largest CO_2 emission item for the filming of La Meute, with a total of 8 t of CO_2 equivalent.

Food is the largest contributor to the footprint for this category (6.44 t of CO_2, about 81% of the total material footprint). The carbon footprint of a meal containing beef is 3-4 times higher than a meal containing chicken, and 13-14 times higher than a vegetarian meal. Several options were examined by the producer and the canteen keeper: either all meals and snacks are vegetarian and those who want meat need to let it be known in advance; vegetarian every day except for one; or focus on increasing the number of vegetarian meals while still having meat options.

- Set rentals have helped reduce the footprint of this category.
- Costumes (92 pieces of clothing) accounted for 0.64 t of CO_2 equivalent.

Unfortunately, there are still no solar or electric generators in Quebec powerful enough to cover the needs of the control room or the lighting department. This option would have been chosen without hesitation by the production.

[2] *The following statement was added to each service sheet: "Please remember to bring your utensils, plastic dishes, cups and reusable water bottles."*

DATA COLLECTION AND KEY FINDINGS

2.3.6 Disposal

To quantify the amount of waste generated, the CQEER weighed the waste bags using a baggage scale.

Collected data:

- Weight (in kilograms) of recyclable materials, compostable materials and ultimate wastes generated after meals
- The volume of material generated by the canteen worker was estimated
- Costume donations: we consulted the costume designers to find out how much of the clothing was given away
- Regarding the sets, we considered the volume of material (mostly lumber) brought to the ecocentre. The ecocentre invoice provides an estimate of the volume brought in.

Positive takeaways from this category

Some of the set pieces were sold off to team members, giving them a second life. The lumber used for the sets was accepted by the ecocentre for a fee. We contacted the ecocentre beforehand to make sure it would take these materials (ecocentres are generally reserved for residents of a territory, and access is granted upon presentation of proof of residence).

Insights

Having a CQEER advisor assist with sorting at mealtimes reduced sorting errors and contamination rates. Elsewhere on the set, we noticed that when the advisor was away, a lot of packaged disposable utensils were put into the recycling. In addition, many compostable containers were mistakenly put in the recycling and garbage bins. It is difficult to have an exact contamination rate due to the absence of the advisor. However, here are the estimates: 5% contaminated compost, 25% contaminated recycling, 50% contaminated garbage.

As is the case elsewhere, sorting errors are common, and the level of contamination often exceeds the acceptable rate for recyclers. In the survey sent to the team after the filming ended, 92% of people stated that the bins made it easier to sort materials.

Compost bags were made available to the props workers, allowing them to recover food waste.

DATA COLLECTION AND KEY FINDINGS

2.3.7 Post-production

The spaces used for film viewing and editing were reflected in the calculator, using the benchmark data provided in the calculator. For the editing suite, we specified the type of energy used (electricity), the number of hours per day spent in the suite, and the total number of days. The same approach was used for the room where the screenings took place.

The carbon footprint for this category amounts to 0.00296 t CO_2. This footprint covers 47 days in a post-production suite with 10 hours of editing per day, and 8 days of 3 hours of film screenings. The energy consumption was 1409 kWh for editing and 72 kWh for screenings.

2.4 General observations regarding the approach

Right from the start, participation in the case study prompted the production team to reflect and to take action in order to reduce their environmental footprint. The carbon footprint is therefore not indicative of a conventional production, but rather of a production that has made efforts to be environmentally responsible. It would be worthwhile to study the footprint of several Quebec productions to have a more representative idea of the environmental impact of the industry.

The following departments are key to the success of an environmentally friendly initiative:

- Production, as it drives the vision and interfaces with suppliers (e.g. caterers)
- The catering department, namely regarding the decision to serve food in bulk (without the packaging) and to use compostable containers and reusable cups, and everything related to the management of residual materials
- The art department (sets and props), as it tends to be where resource consumption and waste are greatest. It therefore offers the best opportunities for reduction at source.

Suggested improvement: The agent responsible for environmental issues needs access to budgets and figures at the end of the shoot to properly assess the overall impact of the production. A non-disclosure agreement may be signed if sensitive information is disclosed for the purpose of calculating the footprint of the film.

DATA COLLECTION AND KEY FINDINGS

There were no post-mortem meetings with the different departments after filming. However, a survey was sent to team members to collect their feedback about the carbon calculation and the environmentally friendly practices used on set. Overall, **92% of respondents[3] believed that they had gained knowledge that was transferable to other sets.** Respondents also mentioned the following factors as facilitators of environmentally friendly actions during the shoot: the crew's motivation and commitment, the production's environmental convictions, and the efforts made to raise awareness and inform the crew.

We asked respondents what their main fears were before filming began. The main fears raised were the lack of time and resources to carry out the environmentally friendly initiative, as well as the limited efforts to ensure the long-term continuation of the actions. The main problem that emerged was the lack of a dedicated time to compile and report the information needed for the carbon calculation. **Furthermore, as filming progressed, crew members grew increasingly tired and less engaged in the process. This demonstrates the importance and benefits of having a person assigned to the eco-responsibility position.**

The CQEER advisor and the production team played an oversight role to target practices that could be improved. Along the way, some fine-tuning was required. For example, on the first day, salads and desserts were served in #6 plastic boxes, which are not recyclable. On site, the production team informed the caterer that they wanted to keep a green profile. The caterer made adjustments and replaced some single-use containers. A salad tray was provided for self-service, and compostable cardboard boxes replaced the #6 plastic containers for desserts.

Looking back, one of the key conditions for success was advanced planning. It is true that an environmentally friendly approach can sometimes require more budgeted time, especially for the proper disposal of residual materials. This is why planning ahead is so important.

[3] *It is worth noting that 19 people responded to the survey, out of the 73 people who took part in the filming of La Meute, for a response rate of 26%.*

3. CARBON FOOTPRINT

Overall, **102.33 t of CO_2 equivalent** were generated by the filming of La Meute, which breaks down to approximately **3.53 t per day of filming** for a two-hour film, which represents **51.16 t per hour of content.** The assessment covers the period from the beginning of pre-production to the end of post-production. For comparison's sake, this corresponds to approximately 350,000 km driven in a medium-sized car. It is also equivalent to about 64 round-trip transatlantic flights,[4] or to the emissions of 11 Quebecers over a year.[5] This also equates to approximately 102 trips between Montreal and Vancouver (one way), or approximately 464,610 km driven.

For purposes of comparison, in 2021, the Sustainable Production Alliance reported the following figures: an average carbon footprint of 3,370 t for US big budget films (about 33 t per day of shooting) and 77 t of CO_2 per hour of content for US drama series. According to Ecoprod (France), the carbon footprint of a multi-site feature film shooting over approximately 30 days is around 1,000 t of CO_2 (i.e. approximately 33 t of CO_2 per day of shooting). Finally, the emissions of film productions in British Columbia vary between 400 and 1000 tonnes of greenhouse gases per production. By comparison, a house in Vancouver emits about 7.5 tonnes per year (Barnabe, 2023).
These figures support the importance of favoring eco-responsible actions in the audiovisual industry.

The small size of the production team, the desire to reduce their footprint and the absence of air travel for the filming may explain the smaller footprint of the La Meute feature film.

The province of Quebec is fortunate to have access to clean energy, namely hydroelectricity, which helps to reduce our CO_2 emissions in this category. The difference in the types of energy used can explain the CO_2 emission gap between France, the United States and Quebec. Indeed, the United States and France use more fossil fuels in their energy production (Ministry of Ecological Transition, 2020; U.S. Energy Information Administration [EIA], 2020). However, in the industry, the use of fuel-powered generators remains a scourge worldwide. According to the Sustainable Production Alliance, “fuel used for transportation and generators tops the list of pollution sources on set. This phenomenon is counted in millions of tons of greenhouse gas emissions” (Barnabe, 2023).

It would be worthwhile to carry out a study to quantify the footprint of the sector in Quebec and thus be able to compare existing data elsewhere.

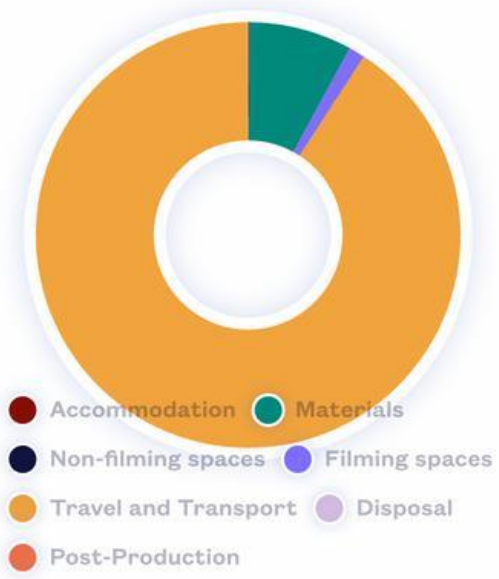
[4] *A single round trip transatlantic flight emits about 1.6 t of* CO_2
[5] *Quebec produces on average 9.6 t of* CO_2 *per year per person.*

Emissions in tonnes of CO_2 equivalent	La Meute Production	Standards for similar productions	Equivalents to La Meute's carbon footprint
Per day of shooting	3.53 t CO_2 eq	33 t CO_2 eq (France)	= 350,000 km in a medium-sized car. = 64round-trip transatlantic flights. = 11Quebecers' consumption over one year. = 102 car trips (one way) between Montreal and Vancouver
Per hour of content	51.6 t CO_2 eq	77 t CO_2 eq (USA)	

CARBON FOOTPRINT

In order of importance, the departments with the greatest impact during the filming of La Meute were:

- The transport department, with a total of approximately 92.89 t of CO_2 emissions. This is consistent with what can be seen in Quebec in terms of the province-wide balance sheet. According to the document *Inventaire québécois des émissions de gaz à effet de serre en 2019 et leur évolution depuis 1990* (Quebec Inventory of Greenhouse Gas Emissions in 2019 and Their Evolution Since 1990) from the Ministère de l'Environnement et de la Lutte contre les changements climatiques, the transportation sector (road, air, sea, rail and off-road) produced the most GHG emissions in Quebec in 2019, generating 36.5 t CO_2 eq, or 43.3% of all emissions. Road transport alone accounted for 79.4% of the transport sector's emissions, or 34.4% of total GHG emissions.



  - The materials department, with a corresponding total of approximately 8.03 t of CO_2.
  - The filming spaces department, with 1.26 t of CO_2.
  - The other categories (accommodation, non-filming spaces, disposal and post-production) had a negligible impact and are therefore barely visible on the graph.

The production will offset its emissions with the help of Arbre Évolution. This organization offers a carbon offset solution via community tree planting activities through their social reforestation program.

Carbon offsetting consists of canceling greenhouse gas emissions by contributing to CO_2 sequestration projects or avoiding future emissions. Several companies in Quebec offer carbon offset products through reforestation projects, tree planting and restoration of our forests. For example, the companies Carbone Boréale, Planète Terre, Arbre Évolution and Eco Sierra provide this type of service. Prices vary depending on the amount of carbon to be offset.

4. RECOMMENDATIONS

To facilitate the development of environmentally friendly filming, the CQEER makes recommendations on three different levels: at the personal level (productions and crews), at the societal level (municipalities and companies) and at the governmental level (financial backers). The recommendations may not apply to other production genres that do not share the same parameters in terms of shooting days or crew size.

4.1 - Individual efforts

On film sets, teams are required to be efficient. Therefore, solutions must be simple in order to work and be embraced by individuals.

4.1.1 - Residual materials management

Limited space does not always allow for intelligent waste management. As an alternative to adding bins for recycling and compost, we made use of floor bags and collapsible stands for recycling bags, which were easily stacked to take less space in the control room truck. Practical, clearly identified equipment is important to facilitate the sorting of materials on the set.

Signage that clearly indicates the bags used according to material type improves waste sorting management and raises awareness among staff.

Using convincing arguments, it is important to make the teams more conscious of the proper handling of their residual materials on set. For example, aluminum has a high recyclability potential. It can therefore be slightly soiled and still be recycled. Glass, on the other hand, is infinitely recyclable, which is why it is so important to recycle it. At the landfill, a glass bottle will take 4000 years to degrade.

4.1.2 - Food sourcing

To encourage people to bring their own reusable containers and utensils, it would be advisable to provide a rinsing station (e.g. a small portable sink with a built-in water tank and foot pump).

RECOMMENDATIONS

Productions could ban single-use products on the set (e.g. individual portions of butter, sugar, etc.), which would be an effective way to reduce waste and the associated management.

Productions could also introduce clear procurement rules, especially for the choice of caterers. For example, make it a requirement that the caterer offer vegetarian and vegan options. In addition, the choice of supplier could be made on the basis of proximity to the shooting location in order to encourage the local economy and reduce GHG emissions from travel. This is one of the reasons why the production of La Meute chose nearby caterers. As well as contributing to the local economy, it also meant that the team was offered a variety of meals, which is always appreciated.

The productions could distribute excess food to employees or to local organizations to prevent food waste. Subsequently, a rigorous review of food surpluses could be carried out in order to reduce waste for future productions.

4.1.3 - Commuting

As mentioned earlier, another way to effectively compile trip data would be to ask the rental company (or companies) to provide the following information for each rental vehicle upon return:

- Model and year
- Fuel type
- Mileage for the rental period

It should be noted that some rental companies charge an additional fee if this information is requested after the client's file has been closed. It is therefore advisable to request such information in advance, so that the company can record it in the file.

It would also be worthwhile to use electric or hybrid vehicles and to choose trailers and trucks of an appropriate size. Additionally, bicycle delivery companies can be a viable option for some facilities. Where possible, consideration should be given to providing bicycle racks to encourage team members to use this mode of transport or to promote the use of public transport. To make this easier, the schedule of public transport available in the vicinity of the shooting should be communicated.

RECOMMENDATIONS

4.1.4 - Communication and awareness

To educate the team and raise awareness, it is important to:

- Provide a daily reminder of the environmentally friendly actions that are expected. For example, bringing a water bottle and reusable utensils.
- Use concrete arguments and provide the impact figures of film sets on the environment.
- As early as the hiring stage, communicate the production's vision for an environmentally friendly set.
- Status meetings are a good venue to get the team acquainted with the person in charge of the environmentally friendly commitments during production. During the pre-production phase, it would have been possible to hold status meetings specifically focused on environmental issues.

For feature film productions with similar schedule and budget parameters, having someone dedicated to environmental issues on the set is key. For other types of productions, or those with a smaller budget, it would be worthwhile to train producers to encourage their team to adopt environmentally friendly practices. In the case of La Meute, the producer noted that environmentally friendly actions were much more consistent when the CQEER advisor was on site.

Similarly, it could be beneficial to offer employees training about environmentally friendly sets.

At the end of the filming, it is important to collect the team members' feedback to gather their views and appreciation of the measures that were introduced and to generate ideas for further improvements.

RECOMMENDATIONS

4.2 - Societal efforts

4.2.1 - Residual materials management

Management of residual materials is one of the biggest challenges facing film sets in terms of environmentally friendly practices. Productions are often denied access to ecocentres, which are only accessible by citizens with proof of residence.

A possible solution could be to provide drop-off points for residual materials in strategic locations in Montreal. These drop-off points should be accessible 24/7. Here are some examples of places that would be convenient: the MELS studios, the Grande studio, Cinepool, or garages in various boroughs.

Other cities that often host film shoots could also provide places for the disposal of waste materials. In addition, cities could attach conditions to film permits based on compliance with certain requirements (environmentally friendly practices).

4.2.2 - Procurement

Equipment rental companies offer solutions that may be of interest to film sets. It would be worthwhile to test these solutions on the sets to see how they can be tailored to their reality. For example, although solar and wind generators are currently not powerful enough to meet the energy requirements of film sets, they could still be used to meet certain energy needs (e.g. lighting).

The pooling of equipment also offers opportunities to reduce the acquisition costs. Each studio could be fully equipped with material sorting bins, signage and ashtrays for recycling cigarette butts, all of which could be loaned to productions.

RECOMMENDATIONS

4.3 - Governmental and institutional efforts

General recommendations

In the course of our work with feature films, shorts and TV series, production companies have shown enthusiasm for environmentally friendly production and willingness to take action.

Unfortunately, the limited resources often restrict the ability to acquire the proper equipment to manage residual materials, the ability to make responsible procurement choices, and the ability to dedicate someone to implement eco-friendly measures. Budget appears to be the main obstacle to the adoption of environmentally friendly actions: equipment (e.g. renting ashtrays to recycle cigarette butts) and dedicated full-time resources represent additional costs. Therefore, we are convinced that financial incentives would result in far more environmentally friendly productions.

We would like to stress the importance of investor support to sustain the green transition of this industry, especially in the current context of the global climate crisis. It would be helpful to carry out further studies of a budgetary nature in order to identify the most effective financial incentives.

In Quebec, the event industry and the cultural sector have already undertaken this exercise. In regard to events and festivals, Tourisme Montréal and the Ministère du Tourisme du Québec (2022) have established an environmentally friendly requirement for funding.

With respect to the Ministère du Tourisme du Québec, festivals and tourism events supported under the first component must be classified by an organization that is certified “Responsible Event Management” under the **BNQ 9700-253** standard (Ministère du Tourisme, 2022).

Finally, the Conseil des arts et des lettres du Québec is now asking that organizations wishing to participate in the 2024 mission commit to:

- Signing up to the Creative Green platform and producing […] the details relating to their carbon footprint
- Adopting a sustainable development action plan with an environmentally friendly component (CALQ, 2022)

For the audiovisual sector, besides the criteria and constraints, we believe that additional assistance in the form of financial incentives would be greatly beneficial. We feel that such assistance would bring real change without adding workload to the film crews.

5. CONCLUSION

Ultimately, the calculation of La Meute's carbon footprint will have raised the awareness of an entire film crew about its environmental impact while providing lessons that can be transferred to other sets. The key to reducing greenhouse gas emissions **is to raise awareness of the impacts, to educate the film crew and to simplify the implementation of environmentally friendly actions**. This is the first essential step towards reducing the sector's ecological footprint.

La Meute is the first Quebec feature film to have quantified its carbon impact. We are very proud of having supported this committed production throughout the entire process. The more productions calculate their carbon footprint, the closer we will get to creating an accurate Quebec benchmark that will allow productions to know where they stand in relation to others.

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