Checklist for game studios to reduce their CO_2 emissions

This checklist can be used even if the studio has not calculated its carbon dioxide emissions.

This paper provides ideas for game development studios of different ways to reduce their carbon dioxide emissions. Ideas are based on the Finnish Game Industry CO_2 calculation model (created by Neogames Finland Association and The Finnish Game Developer Studios Association) and calculations of 2021 emissions provided by number of Finnish game studios. Supporting ideas were checked and collected from Ukie's Green Games Guide[1], game's Environmental Guide[2] and a study published on Environmental Impact Assessment Review on November 2021[3].

This list is not exhaustive. All the feedback is more than welcome to provide the most useful checklist in the future. Feedback can be sent to Neogames' Elina (elina@neogames.fi).

This document is Open Source: it is free to use, share and you can use and modify it for your own work. For your further work (e.g. excels), please reference this paper, as this checklist might be updated at some point.

Latest update on this paper: May 8th, 2023 (terminology).

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[1] Ukie: Green Games Guide
[2] game: Environmental Guide
[3] El Geneidy, S. et al. 2021. The carbon footprint of a knowledge organization and emission scenarios for a post-COVID-19 world. Environmental Impact Assessment Review, Volume 91, November 2021.

Players and YouTube audience

Checklist to reduce player and YouTube audience emissions:

DISTRIBUTION:

- □ Consider the need for physical copies carefully

HOSTING:

- □ Check with your hosting service provider what kind of energy they use to run the servers etc.
  - □ If they don't use renewable or other low/free of emissions energy, hint them to do so and/or ask bids from new service providers with the energy on the checklist
- □ Check if you could get information of your emissions when using hosting services
  - □ This question informs the service provider this topic is important/interesting for you

CODE:

- □ Try to make your code and software efficient
  - □ Does some energy run without extra joy to the players? If yes, try to minimize that
- □ Check the processing power that goes to off-screen objects and see if there is minimizing needs for that power

Background information:

Emissions from players are the biggest piece of the emission cake. The studios conducting 2021 emission calculations evaluated the player emissions from 75% to 99% of the studio's total emissions. YouTube audience was added to the calculations after the calculation period, but the data received on the topic, shows that active YouTube audience can cause almost 20% of the studio's total emission, making it the second biggest piece of the emission cake.

Globally these emissions would drop down if there would be enough renewable energy (or other energy, that is low/free of emissions).

There is not lot game studios can do themselves to reduce these emissions – we want the players to enjoy the games – but there is couple of things: emissions from distributing the games, hosting and the game code.

When it comes to distribution and comparing the physical copy to downloaded game, physical copies (discs) need more raw material and energy to put together than game that downloads from game store. Physical distribution also generates emissions in transportation. Sony estimates that downloading has the lowest carbon emissions compared to discs and steaming.

Hosting is, on our understanding, small part of player emissions. Some hosting services provide game developers information about the emissions caused by using their services (e.g. AWS has launched a customer carbon footprint tool). Some don't and it would be important for them to acknowledge this is important information for the game studios.

When it comes to the code that runs the game, the tools to estimate the efficiency of the code are not that highly developed yet. For example, on XCode there is ratio figures about the power and time (CPU/GPU), but they are hard to convert to actual watts. As we want the players to enjoy the games, the first step is to figure out if there is energy running in vain – to something players don't see at all. Good idea is to check how much processing power goes to off-screen objects and is there something you could do to minimize that.

Work at the office

Checklist to reduce office emissions:

OFFICE

- □ Have an office with a size that suits your studio's needs
    - □ If you have too big office, find (sub-)tenants or new office for your needs
- □ Check the energy efficiency of the office
    - □ If building is very poor in energy efficiency, energy goes to waste and creates unnecessary emissions – fixing the energy efficiency helps to save the energy and reduces the emissions
- □ Check the source of energy (to both electricity and heating and cooling)
    - □ Choose renewable sources or other sources with low/free of emissions
        - When being a tenant, asking landlord for better sources gives them a clue that this topic is important for the tenants.
- □ Check the room temperature – would it be okay for employees to work in e.g. one degree lower temperature?
- □ Check the lighting options you are using – are they energy efficient?
- □ Recycle the waste properly

DEVELOPMENT EMISSIONS

- □ Check the energy efficiency other venues outside the office and the appliances used
    - □ If building and/or appliances are very poor in energy efficiency, energy goes to waste and creates unnecessary emissions – fixing the energy efficiency helps to save the energy and reduces the emissions
- □ Check the sources of energy of the venue
    - □ Choose renewable sources or other sources with low/free of emissions
        - When being a tenant, asking landlord for better sources gives them a clue that this topic is important for the tenants.
- □ NFT: Choose the platform with energy efficiency and so that it does not require massive data mining

PURCHASES

- □ Make all the purchases according to your studio's needs (both in abundance and the suitability to use)
- □ In tech purchases, check energy efficiency and possible recycled resources
- □ Check if you could purchase something recycled (e.g. office furniture)
- □ Recycle the purchases properly in the end of their lifecycle
    - □ If computers etc. are still usable, check options for donating/selling them forward
- □ Do not purchase too much

COMMUTING, COMPANY CAR AND POST SERVICES

- □ Support remote/hybrid working when suitable to your studio and company culture
- □ Support commuting with bicycles and public transportation
- □ Use company car based on the actual need
- □ If you are changing a company car, choose car that needs less fuel to run or electric car

Background information:

Work in the office combines together following parts of the calculation model: office electricity, heating and cooling, if some development emissions come outside the office (e.g. server halls etc.), purchases and commuting, office car and post services. These sections cause around 0.5% - 7% of studio emissions according to our calculations.

Of the emissions the studios can actually do something themselves, office is the second most important topic after travelling (flying).

The most important part of this section is the office, it's energy efficiency and sources of energy. It is important the office size suits the studio needs and it's not too big. This is something that everyone, those who have rented the office space or own it, can do. Bigger the office, more energy is needed to keep it lighted, and heated and cooled.

It is also important that the building is energy efficient and the energy used in the building, both for electricity and heating and cooling, would be from renewable sources (or other low/free of emissions energy sources). Checking the room temperature affects also to energy use and hence the emissions. For those who own their building, this is something they can affect. Those renting the office it is also advisable to ask the landlords about the energy efficiency and source of energy to give them the idea that this is important for their tenants.

Waste management causes only very small part of game studio's emissions, but it is important to make sure that waste management is done properly to support the circle of resources. When being a tenant in bigger building, this might be limited by the facilities provided by the landlord. In those cases it is important to recycle as well as you can and hint the landlord if the recycling is not up to date.

The same goes to other venues, such as server halls game studio might have – checking the energy efficiency and the source of energy is important.

If your company is developing NFT related games, choosing the platform is important. To reduce the emissions, choosing energy efficient platform and operating that does not require massive data mining is important.

Purchases has multiple different categories: technological purchases (e.g. laptops to employees), office furniture, office snacks, merchandise and so on. It is important, in all these categories, to do the purchases based on the studio's needs – both the abundance and the suitability to use. In tech purchases it would be good to check the appliances energy efficiency and if they have recycled resources in them. It is also advisable to check if there is something the studio could purchase as recycled – for example recycled office furniture can be cheaper and still have plenty of good years to use. It is also important to recycle the purchases properly when they are in the end of their lifecycle. Office snacks are very little part of studio emissions, but it is advisable to avoid food waste.

If the studio somehow supports the commuting, commuting emissions can be reduced with the support to bicycling or public transportation (e.g. incentive for bicycling (työsuhdepolkupyörä) or public transportation tickets (työsuhdematkalippu)). Other good way to reduce commuting emissions is supporting remote working/hybrid working if that suits to the company's culture.
If the company uses company car, avoiding unnecessary travels with it reduces the emissions. Choosing the car that needs less fuel or electric car when there is need to change the car reduces the emissions too (with electric car in case that the energy sources for the office where the car is recharged is important!)
In Finland, Posti offsets all the emissions in Finland. Post services and other related services are seldom used in other cases than absolute need, so there is no tick-the-box on the checklist for this.

Work outside the office and travelling

Checklist to reduce working from home and travelling emissions:

WORKING FROM HOME

- □ Check the appliances employees have for working from home are suitable for their needs and energy efficient

TRAVELLING

- □ Travel based on actual need – be critical
  - □ Check if the meeting could take place as a video call
  - □ Check if face-to-face meeting that can't be held as video call, could wait until there is some other need to travel that part of the world
- □ Avoid flying when possible. Choose trains, busses, and ferries
- □ When flying, choose economy class over business or first class
- □ Plan the trips carefully to combine trips together to avoid flying back and forth very often
- □ Offset the emissions with carbon credits from travelling you can't avoid – at least from flying

Background information:

Work outside the office includes working from home and travelling.

Working from home emissions were estimated to be around 0.01%-1% of the total emissions in the studios we received calculations, not a big share of total emissions. To reduce the emissions it is good to check what appliances employees working from home actually need and their energy efficiency.

Of the emissions the studios can actually do something themselves, travelling, especially flying, is the most important part the studios should focus to reduce the emissions.

During 2021 game studios still travelled less than usually due to the Covid-19, and this means that the share of travel emissions were lower than it would usually be. Travel emissions in 2021 were from 0% to almost 15% of the total emissions in the studios. To reduce the emissions, studio should travel based on the need. Travelling by the land rather than flying would also reduce the emissions. Planning the trips so that less trips would be needed could also reduce the emissions. When flying, economy class causes less emissions than flying on business (up to 2.3 times higher emissions) or first class (up to 6.9 times higher emissions)[4]. There are plenty of online calculators for flight emissions, and we advise to use those to see the emissions caused by flying and offsetting the emissions. WWF Finland's Ilmastolaskuri supports calculating other ways to travel as well, making it possible to know how much emissions comes from all the travelling.

Travelling on land and with ferries is slower and usually more expensive than flying, but in many cases, it would be better option when wanting to reduce the greenhouse gas emissions. The time used in travelling can usually luckily be used to effective working time or bonding with teammates.

In the calculation model there were no calculation instruction for hotel visits. Staying on the hotel causes emissions too, but it seems that the amount is not that significant when comparing to flying emissions.

[4] El Geneidy, S. et al. 2021. The carbon footprint of a knowledge organization and emission scenarios for a post-COVID-19 world. Environmental Impact Assessment Review, Volume 91, November 2021.