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Are Smartphones Climate-Friendly?

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ARE SMARTPHONES CLIMATE-FRIENDLY? ☆

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ABSTRACT

The widespread adoption of cell phones has drastically changed our daily lives, affecting how we communicate and access information. However, as smartphone usage continues to grow rapidly, concerns have arisen about its potential misuse and impact on the environment. This article delves into different facets of smartphone usage, examining both its root causes and its consequences. The study used a mixed-methods approach, which included qualitative interviews and quantitative questionnaires. It offers valuable insights into various aspects of smartphone overuse, aiding future endeavors to optimize the advantages of smartphones while minimizing their drawbacks.

Introduction

Good morning, Sunshine! How are you? I was wondering why you didn't call or message me. Our lives have changed from being constantly available to needing space. Whether it's for work, communication, or just to pass the time when we're bored, we are completely reliant on cell phones. Smartphones have a complete influence over us, from the morning alarm to the goodnight message.

A handheld computer of the kind known as a smartphone combines computing power with mobile phone features. Their more sophisticated hardware capabilities and extensive mobile operating systems set them apart from older-style feature phones. These features enable wider software, internet access, and multimedia functionality, in addition to basic phone features like voice calls and text messaging. It can use software just like a PC and browse the Internet.

Our lives are becoming easier than we could have ever imagined. It truly is so intelligent that it keeps track of all our information, stores it on a server, and displays all of our likes and dislikes in the form of suggested videos on YouTube, TikTok videos, or even advertising in search engine results. But do we understand how detrimental smartphones are to both our health and the environment? You heard me correctly. More than we can imagine, smartphones are bad for the environment too. Another factor contributing to climate change and global warming is smartphones. It's funny how, as the most knowledgeable beings on Earth, we haven't grasped how much our comfort and desire for an opulent lifestyle harm Mother Nature. I recognize that it can be challenging to draw a connection between smartphones and environmental harm, but if we change our perspective, the issue becomes much clearer. Do we know the manufacturing process for smartphones? Do we know the impact of smartphones on greenhouse gas

emissions and air pollution?

One such example is the iPhone, which is thought to include 30 different chemical elements, including well-known metals like aluminum, copper, lithium, silver, and, yes, even gold. But this is just the beginning. Our iPhone also contains a variety of uncommon metals known as "rare earth elements," which are valued for their many applications in renewable energy and technology.

Rare earth elements, or REEs, are used by many individuals every day without even realizing it because they are concealed in everyday consumer electronics. An REE called lanthanum helps ensure that the iPhone's screen has vibrant colors, and neodymium and dysprosium are credited with making the phone vibrate, among other things. The production of every smartphone, from the mining of rare earth metals through the manufacturing and assembly of the devices to the delivery of the goods to stores and mailboxes around the world, continues to be a carbon-intensive operation.

Smartphones frequently include some metal-oxide-semiconductor (MOS) integrated circuit (IC) chips, a variety of sensors that can be used by pre-installed and third-party software, and support for wireless communication protocols. For use in distant places without a dependable cellular network, smartphone makers have more recently started to incorporate smartphones with satellite emergency services and messaging connectivity.

The process of creating these phones requires a considerable amount of energy. Kerry Sheehan, the policy director at the repair website iFixit, states that "the production and transportation of new phones greatly affect the environment and climate." Despite the appearance of being a typical high-tech gadget, a smartphone is composed of several materials, including

glass, plastic, and metal.

The extraction of raw materials and energy-intensive procedures are both involved in the manufacturing of electronic products. If not properly controlled, these manufacturing processes produce GHGs and may cause environmental deterioration. The Nancy Wagner, a market strategist and business planner, wrote an article on the basic materials used in smartphones for Techwalla's online page.

Glass:

Glass plays a significant role in a cellphone, particularly in the screen. However, this isn't just any glass. Aluminum oxide, silicon dioxide, and a very thin coating of indium tin oxide are combined to create this glass, which allows you to touch the screen without harming it. Gorilla Glass, a unique, thin, and lightweight toughened glass produced by Corning, is used in some smartphones. According to the MIT Technology Review, sapphire, a material made from aluminum oxide, may replace glass in some smartphones since it is three times as hard as Gorilla Glass. Although the pricey material is still not frequently found in cell phones, Apple does employ sapphire to give its iPhone 5 camera additional protection.

Metals

The most prevalent metals used to make cellphones are aluminum alloys, which are lightweight materials frequently used for the phone casing. The batteries are created using carbon graphite and lithium cobalt oxide. The wiring of the phone is made of materials like gold, copper, and silver. In the circuitry, platinum and tungsten are employed.

According to Dr. Ainissa Ramirez of NOVA Next, about 97 percent of rare metals are sourced from China. These metals are used to make our phone's glass harder and to create magnets, speakers, and motors. Some of

the rare metals used for these purposes are dysprosium, praseodymium, and neodymium-iron-boron alloys. Despite their name, these metals aren't rare, but are labeled as such on the periodic table to explain how they react with oxygen.

Plastics:

Plastic is the third-most frequently discovered substance. Metal is frequently replaced with plastic in cases. A cell phone is more durable when dropped or scratched because it is made of plastic. Plastic is also employed because it can withstand all but the most pronounced temperature changes. The material is incredibly flexible and doesn't interfere with mobile signal reception when you're looking for it. You are holding significant fragments of the Earth's crust that have been extracted from mines all over the world if you are reading this article on a phone, tablet, or laptop.

These all materials are extracted through mining, which is known to cause harm to the environment. The mining industry is a significant contributor to greenhouse gas emissions and also produces fossil fuel resources that heavily impact global CO2 emissions.

In 2021, global leaders convened at the UN Climate Change Conference in Glasgow, UK to address the pressing issue of global warming. The conference aims to limit the increase in global temperatures to 1.5 C above pre-industrial levels, in line with the Paris Agreement and UN Framework Convention on Climate Change. However, the ICT industry, which includes smartphones, computers, and data centers, is a significant contributor to greenhouse gas emissions. It is estimated that smartphone emissions alone could increase from 17 to 125 megatons of carbon dioxide equivalent between 2010 and 2020, leading to an overall increase in ICT emissions from 4% to 11%. According to a study by academics at McMaster University in Canada and published in the Journal of Cleaner Production, this is because smartphones have a limited lifespan, which increases their carbon impact.

To function, electronic gadgets like cell phones, laptops, computers, and servers need electricity. Burning coal, oil, and natural gas to generate energy creates GHGs like CO₂ and CH₄. The energy use of smartphones increases their carbon footprint. Yes, the amount of CO₂ released into the atmosphere is affected by the length of time. Our smartphone consumes more energy when we use it more frequently. Understanding the logic is extremely easy. I'd want to provide a straightforward example to illustrate this concept, taking into account the common folks. According to this LCA research, the Sony Xperia™ T smartphone emits 45 kg of CO₂e into the atmosphere over the course of its lifetime when considering medium usage and a Swedish electricity mix for the use stage, excluding accessories and network consumption. This is equivalent to the quantity emitted after 300 kilometers of driving in a typical European automobile. The production stage of the life cycle, which accounts for little more than 30 kg of CO₂, is projected to have the greatest environmental influence on the outcomes.

The fabrication of integrated circuits (ICs), and the procurement and production of raw phone shell materials, followed by the assembly and distribution of smartphones, are the activities that have the greatest global warming potential (GWP) impacts. The whole life cycle impact for the evaluated scenario, when accessories and the mobile network are taken into account, is 68 kg CO₂e. Eutrophication and acidification are two examples of effects that cannot be inferred from the results of other impact categories. These are the things that are being kept secret from regular people like us who know nothing whatsoever about technology.

We are not ready to face the fact that our cell phones may soon be one of the biggest causes of global warming, despite a wealth of studies and evidence to the contrary. We are so ingrained in our smartphones that we lack the willpower to resist them. In this situation, public education and outdoor activities like camping can

help in some way to inform people about the damaging effects of smartphones on the ecosystem and how to manage our addiction to smartphones.

We have a mini-attack when we misplace our phones or forget to carry them. These small devices have taken over our lives and made us prisoners. Some people may grow psychologically dependent on their smartphones, which causes them to feel uncomfortable when they aren't using them. Smartphone use is common when walking on the road, proving that it poses no threat not only to the environment but also to human life. A temporary "mobile lane" for pedestrians was set up in Chongqing, China, to address the issue of slow smartphone users. Due to the issue of distracted smartphone users, the German city of Augsburg opted to put pedestrian traffic lights on the pavement.

Now, let's talk about e-waste. Improper disposal of electronic waste or "e-waste" can have harmful effects on the environment. When e-waste is thrown in landfills or burned, it releases toxic chemicals and heavy metals that can contaminate the earth, water, and air. This can speed up climate change and also put human health at risk. Therefore, it is important to dispose of electronic waste properly.

Public awareness may certainly help to fix a lot of issues. Customers can control half of the situation if they refrain from using their devices excessively. The company is managing its operations. They make every effort to get us to utilize and purchase their products. However, they cannot compel us. Thus, the general public needs to be informed. What purpose does a single person's use of many smartphones serve?

The lifespans of various cell phones vary, including those made by Apple (4–10 years), Samsung (3–6 years), Huawei (2–4 years), and Xiaomi (2–4 years). Between two and four years is the typical lifespan of a smartphone. However, we seldom take our phone in for repair when it is damaged. Well, that's the reason, and one of the key reasons is that it takes time. Our broken

phone needs to be repaired at the repair shop for more than a week. And we are so dependent on our phones that we are unable to wait for them to be fixed. No patience at all.

These seemingly simple devices have become a trap for our daily existence. For some individuals, being away from their phones can provoke feelings of anxiety due to a psychological reliance on them. Additionally, the high cost of these devices is another consideration. Occasionally, repairing a damaged phone can cost more than buying a brand-new one. However, it's time to think now. What matters most to us? a good climate or our damaging climate habits?

Discussion

My research and survey demonstrate that the smartphones we use daily are contributing to increasing the temperature of global warming.

To expand their business market, companies come up with various new ideas to attract customers. Yes, adding many functionalities to smartphones has effectively covered the market and the price of smartphones. This is the main reason why companies highlight their new apps before releasing a phone model.

Before, the iPhone used to come pre-installed with around 16 apps. These have increased to 35+ now: App Store, iTunes Store, TV, FaceTime, Find My, Safari, Tips, Settings, Files, Mail, Photos, Camera, Contacts, Maps, Messages, Phone, Music, Podcasts, Notes, Calendar, Watch, Voice emoji, Apple Health, Wallet, Translate, Home, Weather, News, Stocks, Reminders, Books, Shortcuts, Utility Apps, Compass, Calculator, Magnifier, and Stocks.

Do we need all of the features and applications that smartphones constantly introduce to draw in customers and demonstrate their uniqueness? Do customers care about it? If so, how many people are concerned about it?

I made several inquiries about what the most popular apps are on smartphones. Results showed that people spend more than 50% of their free time on social networking sites like Facebook, Instagram, WhatsApp, Snapchat, TikTok, and cameras. Due to TikTok, which is the most widely used app among today's youth and is used primarily to share images and videos, smartphone users are more concerned about their phone's camera and video quality. Thus, the majority of consumers use very limited pre-installed apps on their smartphones.

Fair enough. I am not sure how many default apps there are on my phone, as many of them aren't being used. However, it's in our nature to want more and more things, whether we need them or not. What matters is what and how much we have. If we are given the choice between a phone with few apps or, on the other hand, a phone with additional apps, some of which are beneficial and some of which are not, we choose the phone with more apps. However, whether we use those extra apps or not, they nonetheless carry out their functions, like taking up space and storing data.

We, non-technical individuals, don't know a lot about it. Our knowledge of it is limited to non-technical folks. We believe that since we aren't using an app, it doesn't take up any space or save any data. Unfortunately, it doesn't operate that way. Every feature on our phone gathers that information, which is then stored in data centers. I found that several of the stock apps on our devices are still in use.

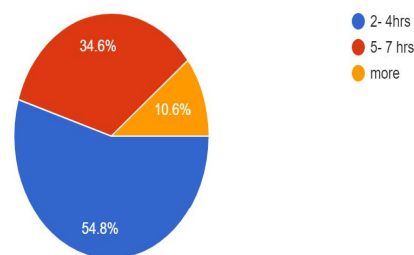
Data centers are an essential component of infrastructure; Every day, enormous server halls store and process data, enabling emails, tweets, and TikTok videos and so on. Because of their large demands on electrical infrastructure and their insatiable appetite for energy, data centers are frequently criticized for contributing to global warming.

If we don't transition to renewable energy for all infrastructure layers, including data centers and communication networks, immediately, in 2018, two

researchers at McMaster University in Canada reported in the Journal of Cleaner Production that "all indicators point to the continuation of explosive growth and its associated carbon footprint."

Many of the digital behemoths have made reducing emissions a top priority, and many have made varied commitments for the ensuing decades. While Chinese company Huawei recently said it would be deploying more energy-efficient equipment, by employing greener technologies, such as antennas, Apple intends to make its 5G networks more environmentally friendly by 2030, when it has committed to becoming carbon neutral. For its operations, the corporation has already made significant investments in renewable energy. The majority of cell phones are now working on a carbon-neutral program; however, that is only for the future. Apple, for instance, stated that it would be carbon neutral by 2030. Right now, the year is 2023. That indicates a lag of seven years. The gap—what about it? The amount of carbon released each year is rising quickly. According to Canadian experts from McMaster University, the carbon emissions associated with smartphone use have expanded to such an extent that they now far outweigh those from PCs or laptops. From 17 megatons of CO₂e per year to 125 megatons of CO₂e per year, they have increased. That represents a growth of 730%.

But how much of those enormous numbers are attributable to our particular mobile phones? Luckily, Berners-Lee has already calculated the environmental impact of cell phones in his ebook "How Bad Are Bananas?" in 2020. This includes taking into account the electricity used by cell phones, as well as the networks and data centers involved in their production. 1,250 kg (2,760 lbs.) of CO₂ for a year's usage at 1 hour per day. 125 million tons of CO₂ from global cell phone usage per year.



Fig(1). Time spends each day on your phone (source: data collection)

My research shows that more than 54.8% of individuals use their phone between 2-4 hours per day, 34.6% use it between 5-7 hours, and 10.6% use it for more than 8 hours. I learned from the calculations that, on average, individuals use their smartphones for about 6 hours every day.

Every year, carbon is released into the atmosphere. It's important to consider that with over 5 billion mobile users worldwide by early 2023, this number will triple the annual carbon emissions to the current amount. According to Berners-Lee, using our mobile phone for just one hour per day can release up to 1250 kg of carbon in a year. If someone uses their phone for six hours per day, that number goes up to 7500 kg. And with over 5 billion people using cellphones worldwide, the total amount of carbon emissions is staggering. In fact, 3750000000000 kg of carbon are released each year from cell phone use alone, and that number is only expected to increase. It's important to keep this in mind and find ways to reduce our carbon footprint whenever possible.

Another major cause is the manufacturing process. It is actually where the majority of carbon emissions related to mobile phones are produced.

iPhone model	CO2 emissions	Production	Transport	Usage	Recycli
Apple iPhone 12 Pro Max	86kg	82%	2%	15%	<1%
Apple iPhone 12 Pro	82kg	86%	2%	11%	<1%
Apple iPhone 12	70kg	83%	2%	14%	<1%
Apple iPhone 12 Mini	64kg	85%	2%	12%	<1%
Apple iPhone SE (2nd gen)	57kg	84%	3%	12%	<1%
Apple iPhone 11 Pro Max	86kg	78%	3%	18%	<1%
Apple iPhone 11 Pro	80kg	83%	3%	13%	<1%
Apple iPhone 11	72kg	79%	3%	17%	<1%

Fig(2): Different iPhone models emit different levels of CO2. (source: Reboxed. <https://reboxed.co/blogs/outsidethebox/the-carbon-footprint-of-your-phone-and-how-you-can-reduce-it>)

Looking at the statistics published by Apple for the iPhone line allows us to determine exactly how much of the carbon footprint is related to production. Apple analyzes the lifetime carbon emissions of all iPhone models and publishes the results as part of its environmental policies. The majority of carbon emissions are generated throughout the production of every iPhone, starting with the iPhone 5 and ending with the newest model, the iPhone 12. The most effective way to reduce your smartphone's carbon footprint is to be mindful of the device and practice sustainable habits.

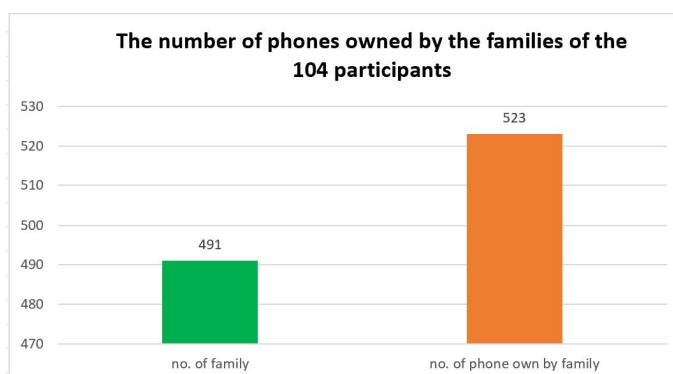
It is now impossible to live like our ancestors because modern living is so sophisticated and luxurious. But at least we can attempt to manage it. As is often said, every issue has a solution. To monitor the ratio of carbon emissions and attempt to address it, we can utilize various cutting-edge tools. Artificial intelligence (AI) technology might be a good answer in the current situation.

Climate change is one of humanity's critical issues that requires prompt and innovative solutions. AI offers a viable tool to aid in lowering greenhouse gas emissions, boosting climate resilience, and promoting sustainable practices thanks to its data processing capabilities and sophisticated algorithms. It provides a range of resources and programs that can lessen the effects of climate change and support the development of a more

sustainable future.

Although AI has a lot of potential for combating climate change, it's critical to address ethical issues and make sure that these technologies are used ethically, transparently, and concerning potential biases in the data and algorithms. To maximize AI's beneficial effects in the battle against climate change, researchers, governments, and the corporate sector must work together.

According to Deloitte's 2022 CxO Sustainability Report, businesses that want to accelerate their climate action will need to integrate climate considerations into every aspect of their operations, which might require a fundamental change to their business models. Unquestionably, longer smartphone lifespans would change how the smartphone business makes money and creates revenues.



Fig(3). No. of phones owned by the families of 104 participants. (Source: data collection.)

The bar diagram clearly shows that there are more phones in use than the number of family members. It's important to note that this includes children who don't use phones, yet the number of phones still exceeds the number of family members. This indicates that some individuals carry multiple smartphones. Making a regulation like "one person, one smartphone" would, in my opinion, be another approach to reducing the need to purchase more smartphones. The carrying of an additional smartphone should be restricted in the same

way as the number of SIM cards.

If smartphone manufacturers classified their devices into distinct categories, such as smartphones with some advanced capabilities and smartphones with extremely simple default installed apps, this provides many benefits, including giving smartphones with limited features or apps more storage because internal capacity will be used less frequently. The amount of data in the data center and the amount of energy used will both be reduced. Additionally, customers who require smartphones with cutting-edge functions and apps will purchase advanced smartphones, which have many advanced programs. We use laptops for demanding programming tasks and resource-intensive software, so I doubt that I'm recommending anything particularly challenging.

Another option might be to use repurposed materials. Reusing materials reduces the need for mining, a process that emits a lot of carbon. Circuit boards, batteries, and enclosures can all be made from recycled materials like tin, cobalt, and aluminum. Even rare-earth elements, whose small size was formerly thought to exclude their application in industry, may now be recycled thanks to technology.

Excessive use of smartphones has a negative impact not only on the climate but also on human health. Numerous patterns of smartphone abuse were found, including excessive screen usage that resulted in social isolation, a decline in face-to-face interactions, and disturbed sleep cycles. One major worry is the rise of smartphone addiction, especially among younger users. The study also found a connection between smartphone abuse and poor mental health, falling academic performance, and lower work productivity. In the August 2011 issue of "Science," a study was published which concluded that the constant availability of information through search engines, specifically Google which handles over a billion searches daily, is altering the way our brains retrieve and retain knowledge. In

their conclusion, they stated that they believe that internet-connected devices, specifically smartphones, have integrated themselves into our lives so much that they have become a "source of external memory." If we are unable to alter our smartphone usage patterns for the sake of the environment, we can alter our habits for the benefit of our health and the health of our children.

Methodology

Although the front end of a smartphone can be highly captivating, are we also familiar with the back end? Are we making good or bad use of smartphones? This research was inspired by these personal curiosities. And the results I discovered are equally astounding. To complete the investigation, I used a different method. The main objective of this study is to know whether cell phones have any connection to climate change.

I utilized the following research techniques to get a complete set of cases from academic sources: peer consultation, manual search, search of reference lists, computer searches using Academic Search Premier, and my observations from everyday life. The computer's search approach was adaptable and changed as the research went on.

To guarantee a diverse representation of viewpoints, the data collection method was conducted over 1 month and included several geographic areas. A wide sample of smartphone users from various individuals who, like me, use smartphones regularly and who range in age from 15 to 60 or older was included. I selected individuals with a variety of educational backgrounds, occupations, and genders to gather and analyze data on a broad scale.

The smartphone has advanced significantly in a short period. It is now incredibly intelligent. Most tasks are completed on a smartphone. Although many people use their smartphones as workstations, are we aware of how they affect both our daily lives and the environment? Sounds absurd, huh? However, it is a fact that

smartphones are now a significant contributor to climate change. I was curious to discover if people were aware of all these issues or if they were just so naive as to believe that smartphones had no impact on the environment.

As they say, it all begins with you and your house. That exact thing also occurs to me. I started paying attention to my family's smartphone usage patterns and demands. I continued to keep track of the apps I used, and my family did the same. I did take note of the fact that I carry many smartphones around just for fun and show off.

I asked myself, "How many hours per day do my family and I spend on our phones?" Do we use our phone for work or just for leisure? Most of the time, the answer to my question was intriguing and led me deeper into it. I was genuinely curious as to what impact smartphones have on people's lives now. As a result, I created a questionnaire about smartphones and their usage. What factors do customers consider when purchasing a smartphone? what the most popular applications are, and what kinds of apps they use and why. I was able to gather information from 16 different nations through individuals, and over 100 respondents provided their responses on a Google Form for the study. Some respondents were disqualified from the study since it was discovered during data cleaning that they had submitted their responses incorrectly. Only proper and accurate responses from respondents were chosen for the research to ensure that the data analysis was reliable.

It was necessary to disassemble and analyze a variety of smartphones that had been categorized to learn what kind of phone customers preferred. Both the modeling and the analysis were done using basic MS Office. A sensitivity analysis was carried out on several model parameters to assess the impact of the hypotheses and methodological decisions made for the study. This survey improved my understanding of psychology and behavior in people. Mainly, what drives smartphone use?

how important smartphones are to the current generation.

So that everyone may understand, I decided to present my points in a very straightforward manner. I chose to simply display the bar diagram that depicts the total number of participants' family members and the total number of cell phones owned by their families rather than demonstrate or explain some mathematical process. The graph demonstrated that there are more smartphones than there are families.

Similarly, I used a pie chart to display how long people spend using their smartphones. I used this graphic to compute the average amount of time spent on a cell phone and to round up the carbon emissions.

Sincerely, finishing the entire study session wasn't that simple. Data collection was the most challenging aspect. It was difficult to get individuals to participate in my work because it was entirely data-based, which was the basis of all of my work. They initially didn't seem to be working together very well. Some people feared that their data would be exploited, and others found it awkward to have their identities revealed. I was able to gather data from more than 100 individuals at the end. Data organization was yet another issue for me. Although only two data points were entered incorrectly, some other data needed to be excluded as well.

Overall, my research work demonstrates that smartphones are more harmful to the environment than we can imagine, and the most terrifying part is that their effect is increasing quickly as the rate of smartphone use increases.

Finding/ Result

The results of this research paper were very predictable, to be honest. This paper was about how smartphones are hurting the environment and climate change. During the research period, I found that normal people are very naive when it comes to technology.

The major finding is the lack of proper information about smartphones. When I asked some participants about the negative side effects of smartphones on climate change and global warming, they couldn't answer. They didn't believe it when I tried to explain to them how smartphones are affecting them. However, when I explained to them about the mining point, they showed some interest, and I convinced them to give it some thought. This shows that if we can pass the information clearly to the customer, then there is still hope that we can control the use of smartphones. People are not willing to believe that electronic devices have something to do with carbon emissions. The whole world is becoming digitized, and the public only knows the advantages of it. They have zero knowledge about its negative side, especially about carbon emissions and climate change. It is essential to convey information about both the negative and positive sides of the new technology to the public. People should know the proper way to use it. We should set some rules to control it so that we can use technology without having much impact on the environment.

Another interesting thing I got to hear during the meetup is that people are not worried about the future generation. They are only focused on the present situation. A few individuals expressed uncertainty about what might occur the following day. Why worry about tomorrow? When I talked about messages and videos we make on smartphones, I got some funny replies, like their partner gets upset when they don't message them in a few intervals of time. Some people say they earn from TikTok, so they want the best smartphones. They carry multiple phones as they buy the latest phones, and they cannot throw away the old phones.

Smartphone companies come up with new tactics to increase the sales rate of their products. Manufacturers have chosen to glue in batteries rather than use replaceable screws, making it more difficult to access the batteries and to open up the phones themselves. These are choices made by manufacturers during the

design phase that have nothing to do with the technology of the battery itself, but they purposefully make battery replacement and maintenance far more challenging. Making cell phones last longer will significantly reduce the carbon emissions they produce, claims Kerry Sheehan, iFixit's policy director. She noted that after upgrading to a new model, consumers frequently dump their old phones in a drawer at home or the trash. This year, 57.4 million tons of e-waste are anticipated to be produced worldwide.

This study made it clear that although smartphones emit carbon and have a negative influence on global warming, we can take steps to lessen their carbon footprint and do our part to help the environment. Sometimes a small alteration we make can have a big impact. We believe that a comprehensive solution will only be able to partially reverse the effects of climate change. No, that is wholly unfounded. I believe that we can begin at home, or even with our hands.

A discount can be offered by the company if a consumer returns their old smartphone when purchasing a new one. This is advantageous to both parties. Customers are pleased when they receive discounts, while businesses make money since they can recycle some of the components of outdated smartphones' hardware. To produce cell phones, a company must undertake numerous stages, including mining, labor costs, transportation, and many more. Reusing resources will help slow down the exploitation of minerals, which will ultimately contribute to climate change. Even though it may seem absurd or insignificant, if we consider the long run, it will have a significant impact. With the abundance of smartphone manufacturers, adopting the reuse concept would make a significant positive impact on the environment.

Artificial intelligence can be applied to various aspects of the energy sector such as carbon capture, smart grids, energy efficiency, renewable energy integration, and forecasting. Create AI applications that can estimate the

daily carbon emissions from smartphones, and these applications should be able to limit the use of the phone if the carbon cap is reached.

We have done a thorough inventory of how information and communication technology (ICT) affects the environment. This includes things like computers, laptops, smartphones, and tablets, as well as infrastructure like data centers and communication networks. Based on research, it seems that the impact of ICT on the environment is expected to grow significantly. In 2007, it accounted for only 1% of the global environmental footprint. However, by 2020, it's expected to rise to 3.5%, and eventually reach 14% by 2040.

The study suggests a multi-pronged strategy that includes awareness campaigns, instruction in digital literacy, and the use of screen-time management tools to address this complex issue. To promote a healthy relationship between people and their devices, cooperation among smartphone manufacturers, politicians, educators, and mental health experts is crucial.

In conclusion, the improper use of cell phones presents serious issues for both individuals and society as a whole. Understanding these negative consequences and taking steps to mitigate them becomes more and more important as technology develops. It is easier to make people understand things that can be visualized in some way, but we are talking about carbon emissions. It's a gas that cannot be seen with the eyes, so it is very difficult to make people understand. Thus, we need to focus on teenagers and adults for awareness. I focus on teenagers and adults because they have a curious nature and can comprehend concepts more vividly.

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