SURVEY PAPER ABOUT CARBON FOOTPRINT

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ABSTRACT:-

The aim of this proof of concept is to develop a framework to trace the carbon footprints emitted by fossil fuels during power generation. The framework will utilize a life cycle assessment approach to identify the amount of greenhouse gas emissions associated with each stage of the power generation process, from raw material (fuel) extraction to power delivery. The proof of concept will focus on the use of coal and natural gas, which are the most widely used fossil fuels in power generation.The data collected from sources is used to create model which can help us to estimate the amount of carbon footprint generated from different types of power plants like coal-fired power plants and natural gas-fired power plants.The results of this proof of concept are analyzed to identify areas where we can reduce the greenhouse gas emission and also to develop and deploy strategies to transition to cleaner sustainable energy sources.Overall, this concept will provide a valuable tool for energy policymakers and stakeholders to make informed decisions about reducing carbon footprints from fossil fuel power generation

KEYWORDS:-

Carbon Footprints, Coal, Natural gas, Power Generation, Greenhouse Gas Emissions, Energy Sources.

INTRODUCTION:-

Our modern 21st century world uses electricity as the main energy source in almost all devices and in modern equipments.However the generation of electricity through burning of fossil fuel has a major impact on the environment as it contributes to the emission of large amounts of greenhouse gasses especially carbon dioxide(CO2).This CO2 causes climatic changes through global warming.Hence it is captious to analyze and trace the carbon footprints of such greenhouse emission so that we can identify opportunities to reduce such emission and transit to cleaner energy source.In our paper we will explore the methods to trace carbon footprints during energy production using fossil fuels like coal,petroleum etc by life cycle assessments to identify the emissions associated with each stage of the power generation process,starting from raw material (fuel) extraction to power delivery. We will also discuss and examine the strategies that are being developed to reduce the emission levels like carbon capture and storage, energy efficiency measures, and the transition to renewable energy sources.Generically,this paper provides compendious overview of issues involved in tracing the carbon footprints during the energy production using fossil fuels and also emphasizing the acute action to address the impacts of climate change.

RELATED WORKS:

Releasing Hothouse feasts causes global warming.The methodologies for carbon footmark computations are still evolving. It's veritably important to find the result for it. Global warming is getting a hotspot in numerous regions.Many nations are trying to reduce carbon vestiges.This exploration examines the force chain of carbon vestiges operation in industries and factories of various countries.Hence an effective solution using modern technology is required to analyze and reduce the carbon footprints.This paper talks about the current situation of the Carbon emission trend and tries to provide an effective way to decrease the carbon emission in the future.

WHAT ARE CARBON FOOTPRINTS??

Carbon footprint is a term used to describe the total amount of greenhouse gasses like Carbon dioxide(CO2),Methane(CH4),Nitrous oxide(N2O)..etc that are emitted into the atmosphere due to the resultant human activities. These activities include burning of fossil fuels like coal,oil and natural gas for production of electricity,release of CO2 from vehicle exhaust etc.In simple terms,the larger the production or consumption of energy,the larger is the carbon footprint.

MEASURING OF CARBON FOOTPRINTS?

Governments and investors are showing a great interest in artificial intelligence (AI)-based learning systems that use algorithms to identify patterns in data sets and make predictions, recommendations, or decisions in real or virtual about the change in environmental patterns. AI can predict future carbon emissions based on current information on carbon tracking.Dynamically,the integrated AI system also helps in estimation of Footprint generation. After analyzing the data will be used for predicting how much carbon is emitted and it can also show how the carbon emission can be controlled . The AI will predict where the energy is used unwantedly and how the usage of energy can be controlled. The AI will analyze and predict how the carbon is produced or released.CO2 equivalent is a measure that is used to express the total amount of greenhouse gasses emitted as a result of human activities.

Carbon Footprints by different countries:

Countries with a large economy, large manufacturing are reasons for emitting greenhouse gasses that may produce a large amount of carbon emission from the industries. These are the countries with larger per capita that release large amounts of carbon emission. CHINA is the most carbon producing country in the world, because there are many manufacturing industries ,chemical factories. These are the major reasons for more carbon emission.

The carbon emission in CHINA is increasing year by year. CHINA is the country with the most carbon emission. CHINA produces about 28% of the carbon emission in the world. The USA holds the second position in most carbon emitting countries with 15% of carbon emission in the world. The carbon emission in the USA is reducing year by year.The INDIA holds the third position in most carbon emitting countries with 7% of carbon emission in the world.The carbon emission in the INDIA is reducing year by year. The RUSSIA holds the fourth position in most carbon emitting countries with 5% of carbon emission in the world.The carbon emission in the RUSSIA is reducing year by year.The JAPAN holds the fifth position in most carbon emitting countries with 3% of carbon emission in the world.The carbon emission from JAPAN is reducing year by year. Countries apart from CHINA is seen in reduced emission of carbon.The countries like USA, INDIA, RUSSIA, JAPAN are taking controlling measures for reducing the production

Of carbon .The CHINA is the country with more manufacturing industries,chemical factories,etc… . The population of China is more with the population and the industries and factories are also increasing rapidly. Which causes more production of carbon emission. They can try to control the carbon emission by tracking the amount of carbon released and they can replace the energy sources from petrol,gas, coal with renewable energy resources like windmills,solar plants,hydro power , etc.

Carbon emission can be controlled when we stop or reduce usage of natural resources. The carbon footprint can be calculated by using the previous readings of the energy consumed or used .The AI can be used to restrict the usage of energy for some limit this can help in reducing the carbon emission. The reduced usage of resources like coal,gas,petrol can result in reduced production of carbon.so the large industries or factories should try to use the renewable resources as their power source to reduce carbon emission.The industries can't run without using resources like coal, petrol, gas,etc .But we can try to reduce the usage of these resources, and we can try to adopt using renewable resources.

IMPLEMENTATION OF ARTIFICIAL INTELLIGENCE IN CONTROLLING THE CARBON EMISSION :

One of the effective ways to reduce carbon footprints is to use AI technologies.With the advent of new machine learning algorithms,more and more governments of the world are showing interest in implementing AI based technologies to reduce carbon footprints.The machine learning algorithms can be used to analyze the current and previous trend and predict the future estimated

emission.This forecast helps us to take necessary steps to reduce the future emissions,ultimately leading to decrease in carbon footprint production and global warming.o

CARBON FOOTPRINT REDUCTION :

Reducing carbon footprints from industries are necessary to combat climatic changes.
Here are some effective ways for reducing carbon footprints from industries,

->Industries can change their energy sources to renewable energy like solar energy, windmills, hydro power plants .
->Industries can reduce their carbon footprint by reducing waste and start recycling them.
->Industries can reduce their carbon footprint by improving transportation. They can switch to electric vehicles, and use alternative modes of transportation such as rail or water transportation.
->Industries can reduce their carbon footprint by using low carbon materials like recycled steel, concrete,glass.
->Industries can use carbon capture and storage methods to reduce the emission of carbon.The industries will capture the carbon released and they will store the carbon.
->The industries can teach their employees and stakeholders about the importance of reducing carbon emission.

LIFE CYCLE ASSESSMENT(LSA) :

Life cycle assessment is a systematic process of analyzing the pollutants that affect the environment.During the life cycle assessment we will analyze the total amount of pollutants released during the entire process like production , distribution, use and end of life process.Life cycle impact assessment covers all the inputs like emission into air,soil,water,etc(eg. Carbon dioxide,nitrogen oxide).The life cycle assessment calculates the amount of impact on the environment caused by the gasses or chemicals released into the environment during the process of extraction of raw materials, production, use, and disposal of materials.The main goal of life cycle assessment is to analyze the impact of the emission and give the description to the stakeholders to make informed decisions about the sustainability about the products and the services.
The life cycle assessment usually has four phases that help in analyzing the impact.

1)Goal and scope definition
2)Inventory analysis
3)Impact assessment
4)Interpretation

LIFE CYCLE ASSESSMENT PHASES

Goal and scope definition :

The goal and scope definition is a phase where the goal and scope of the assessment is defined.
INVENTORY ANALYSIS :

The inventory and assessment is a phase where the compiling the input and output of the product over its entire life cycle.
IMPACT ASSESSMENT :

CARBON FOOTPRINT

PROGRAM AND ALGORITHM;

We are going to use python Code carbon to estimate the CO2 emission during the execution of code.Note that CodeCarbon uses a world average of **475 gCO2.eq/KWh** when the carbon intensity is not available. The emissions are saved into a CSV file named emission.csv.Hence we use the formula as:

CO_2eq=Power_consumption(kilowatt-hours)*Carbon_Intensity(kg of CO_2/kilowatt-hour)

Algorithm:

Step1: Start the program.

Step2: Import the carbon code file and get the input from the user.

Step3:Parse the code for syntax error using syntax analyser.

Step4: If there are any errors,terminate the program.Else proceed further to the next step.

Step5: Using code analyzer,identify potential carbon emission in the code.

Step6: Calculate the carbon emission from the previous step and the user's preferred carbon footprint calculation method.

Step7: Display the calculated result.

Step8: Suggest the user with options for reducing the carbon footprint such as optimizing the code or choosing more energy efficient providers.

Step9: If the user opts for optimizing the code,provide suggestions to reduce carbon footprint in the code.

Step10: If the user opts for a more energy efficient hosting provider,recommend providers who give importance for sustainability.

Step11: End the program.

PROGRAM:

We have to install code carbon by using pip.

It supports two mode namely:

1.)Online mode
2.)Offline mode

1.)The online mode requires an internet connection to retrieve Geographical location.The below are two methods of coding in online mode that uses decorator and without decorator.

2.)The offline mode can be used when there is no internet connection available and the location is obtained by entering the ISO code of the country manually.

CONCLUSION:

The carbon footprint emitted by the fossil fuel during the power generation that affects the climatic change. The use of this life cycle assessment is to efficiently reduce the carbon emission. By focusing on the most widely used fossil fuels in power generation, coal and natural gas, this proof of concept has the potential to inform energy policymakers and stakeholders on strategies to clean, more sustainable energy sources. This concept provides us valuable information for reducing carbon footprints and improving sustainable energy.

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