

Policy Analysis: AI and Sustainability: Climate Impact Monitoring

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Abstract

Organizations are responsible for reporting two emission metrics: direct and indirect emissions. Reporting direct emissions is fairly standard given activity related to the generation of such emissions typically being performed within a controlled environment and on-site, thus making it easier to account for all of the activities that contribute to such emissions. However, indirect emissions stem from activities such as energy usage (relying on national grid estimates) and operations within a value chain that make quantifying such values difficult. Thus, the subjectivity involved with reporting indirect emissions and often relying on industry estimates to report such values, can unintentionally report erroneous estimates that misguide our perception and subsequent action in combating climate change. Leveraging an artificial intelligence (AI) platform within climate monitoring is critical towards evaluating the specific contributions of operations within enterprise resource planning (ERP) and supply chain operations, which can provide an accurate pulse on the total emissions while increasing transparency amongst all organizations with regards to reporting behavior, to help shape sustainable practices to combat climate change.

Relevance

Exigency: Currently, there is a lack of accountability and limited adherence to emission protocols given an inability to accurately estimate primarily indirect emissions that stem from enterprise resource planning and supply chain practices. As such indirect

emissions account for over 70% of total emissions in many industries, such may thwart meaningful steps toward sustainable commercial practices and responsibilities.

Use of AI: AI can provide the compute power and infrastructure needed to power predictive models for energy usage, needs for companies that are currently struggling to comply with standards like the Greenhouse Gas Protocol. AI platforms can report energy usage and needs easier and more accurately through a decentralized cloud service. Increased data on energy demands provide policy makers with the context to inform decisions when establishing legal parameters for sustainable energy use.

Impact

Leveraging AI capabilities in the realm of carbon emissions and energy management would enable for more transparent, accurate and personalized models of commercial energy needs. Accurate reporting would in turn give a realistic portrait of the energy climate in private enterprise. Measuring entities by their scale and level of energy usage instead of industry or national averages would create a space for greater accountability and drive to innovate processes to increase efficiency.

Innovation

Tech Application: Integrating the use of natural language processing (NLP) to evaluate the emission footprint within ERP and supply chain life cycle processes can accurately quantify both direct and indirect emission profiles of the individual components within a workflow that traditionally may be misrepresented when grouping processes together via national averages. Scope 2 & 3 emissions often are difficult to assess given the variety of data sources involved and complexity in analyzing multifaceted supply chains. Employing NLP to collectively extract and compile findings from diverse sources (i.e.

emissions reports, sustainability disclosures, procurement approaches, inventory management, transportation, and production processes) can accurately report indirect emissions for specific workflows by further breaking down and specifying measurements from national averages (ex. national grid) while actively evaluating whether alternative routes or practices can be leveraged to significantly curb footprint consumption. LLMs can further integrate metrics from the internet of things (IoT) to provide real-time feedback on existing operations that can guide decision-making when trying to actively combat an increasing footprint while sustaining optimal performance. Lastly, the integration of this AI platform within a decentralized network standardizes reporting procedures amongst organizations to increase both the validity of estimates and transparency amongst organizational operations. Adopting an AI platform is critical towards documenting direct and indirect emissions to obtain an accurate pulse on national and global emission levels.

Creativity: An LLM platform not only can provide real-time assessment of the existing direct and indirect emissions footprints that are emitted per workflow, but can also benchmark performance to strategically evaluate whether alternative routes may be more feasible to curb emissions. Thus, leveraging an LLM platform can sustain both accuracy in reporting metrics and efficiency in operations to guide operating behavior within the confinements of emissions protocols.

Feasibility

Technical Feasibility: While AI holds great potential in revamping the way in which economies measure and react to energy use, adjacent technological innovation poses a significant limiting factor in allowing companies to act on improved energy consumption

models. For example, alternate energy infrastructure like modular nuclear reactors needs to be scaled to provide a viable route for growing demands. On the other hand, chip engineering and efficiency is another bottleneck that can prove to limit the pace at which industries can adapt to leaner carbon emissions. Using AI to manage energy usage itself will require significant power utilization. However, the silver lining seems to be that AI can be used to iterate on current states in the aforementioned sectors to provide the pathway for innovative solutions to address the need for green energy sources and efficient computing capabilities.

The cost of implementing new energy management tools may be a filter for many companies to adopt, especially for small businesses that make up nearly 45% of the national economy.

Furthermore, implementing AI solutions for energy management will involve multidisciplinary industry engagement to effective implementation. Overfitting and underfitting are critical gaps that need to be accounted for since these models may not accurately adapt to nuanced and new situations as a result of global geopolitics.

Policy Feasibility: The diverse nature of each industry and countries equates to an array of different regulatory frameworks and standards that may make creating a uniform policy on energy management led by AI difficult. Additionally, although there are protocols and global emission standards like the Kyoto and Greenhouse Gas protocols, there are currently no standards or guidelines for AI led energy management systems. This poses a significant challenge since companies may struggle to develop legally compliant AI tools for energy modeling. As AI itself continues to evolve, so will its regulatory environment. Strict clampdown laws at the early stages of AI development

may curtail effective innovation in AI solutions and may be rendered quickly obsolete as AI continues to mature.

References

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