
Can a 5G base station promote green development of mobile communication facilities?

However, a significant reduction of ca. 42.8% can be achieved by optimizing the power structure and base station layout strategy and reducing equipment power consumption. Overall, this study provides a clear approach to assess the environmental impact of the 5G base station and will promote the green development of mobile communication facilities.

How much energy does a 5G base station use?

China Mobile's measurement report 9 indicates that the energy consumption of a 5G base station is 4.3 kWh, which is four times that of a 4G base station at 1.1 kWh. One 5G base station is estimated to produce 30 t of carbon emissions in one year of operation 10.

How much carbon does 5G emit in China in 2021?

The results indicate that, due to the high carbon emissions resulting from the new infrastructure, the carbon emissions of 5G base stations in China in 2021 amounted to 49.2 MtCO₂ eq.

Are 5G mobile networks a carbon efficiency trap?

We reveal a carbon efficiency trap of 5G mobile networks leading to additional carbon emissions of 23.82 Mt in China, caused by the spatiotemporal misalignment between cellular traffic and energy consumption in mobile networks.

What is the system boundary of 5G base station?

The system boundary of the CO₂ of 5G base station The civil construction of 5G base stations is typically carried out using the existing infrastructure of 4G base stations, resulting in less material input during the construction phase. The primary focus on carbon emission generation is during the use phase due to power consumption.

How many 5G base stations were built in 2020?

Construction of 5G base stations accelerated in 2020 and a total of 718,800 base stations were built, resulting in a sharp increase in carbon emissions. Carbon emissions during the operational phase account for the largest proportion among the other phases of the entire lifecycle.

It is important for China's communications industry to reduce its reliance on grid-powered systems to lower base station energy costs and meet national carbon targets. This study examines ?

Sep 1, 2025 Here we develop a large-scale data-driven framework to quantitatively assess the carbon emissions of 5G mobile networks in China, where over 60% of the global 5G base ?

Jul 1, 2022 Overall, this study provides a clear approach to assess the environmental impact of the 5G base station and will promote the green development of mobile communication facilities.

Jun 12, 2025 The rapid development of 5G technology leads to increasing energy consumption in base stations (BSs). For the vision of green and sustainable communications, we propose a ?

Jul 1, 2022 However, a significant reduction of ca. 42.8% can be achieved by optimizing the power structure and base station layout strategy and reducing equipment power consumption. ?

Oct 28, 2024 Energy efficiency plays an important role in intelligent networking for 5G networks, which concerns environmental, financial, and performance aspects of intelligent networking for ?

4 days ago These outcomes demonstrate that upgrading to low-carbon base stations not only ensures economic feasibility but also delivers significant environmental and public health ?

Oct 14, 2024 The results show that the factors that have significant impacts on the environmental radiation power density of 5G base stations including transmission distance, ?

Oct 17, 2021 This paper proposes a power control algorithm based on energy efficiency, which combines cell breathing technology and base station sleep technology to reduce base station ?

Jun 26, 2024 This paper proposes a novel 5G base stations energy consumption modelling method by learning from a real-world dataset used in the ITU 5G Base Station Energy ?

Aug 7, 2025 Explore in-depth technology metrics for 5G systems, comparing key specifications across base stations, uplink CPEs, and user devices to understand network design and ?

Jul 7, 2020 YEEB will strengthen collaborative governance with YSTC, sub-districts, operators and China Tower, strictly implement the MOU in future work, enhance the sense of ?

Jan 23, 2023 However, there is still a need to understand the power consumption behavior of state-of-the-art base station architectures, such as multi-carrier active antenna units (AAUs), ?

Jun 30, 2022 The emergence of 5G networks will drive social change. However, 5G networks require construction of numerous base stations, leading to greater carbon emissions. ?

Oct 6, 2023 However, the energy consumption and carbon emissions of 5G mobile networks are concerning. Here we develop a large-scale data-driven framework to quantitatively assess the ?

Aug 17, 2023 Here we develop a large-scale data-driven framework to quantitatively assess the carbon emissions of 5G mobile networks in China, where over 60% of the global 5G base ?

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