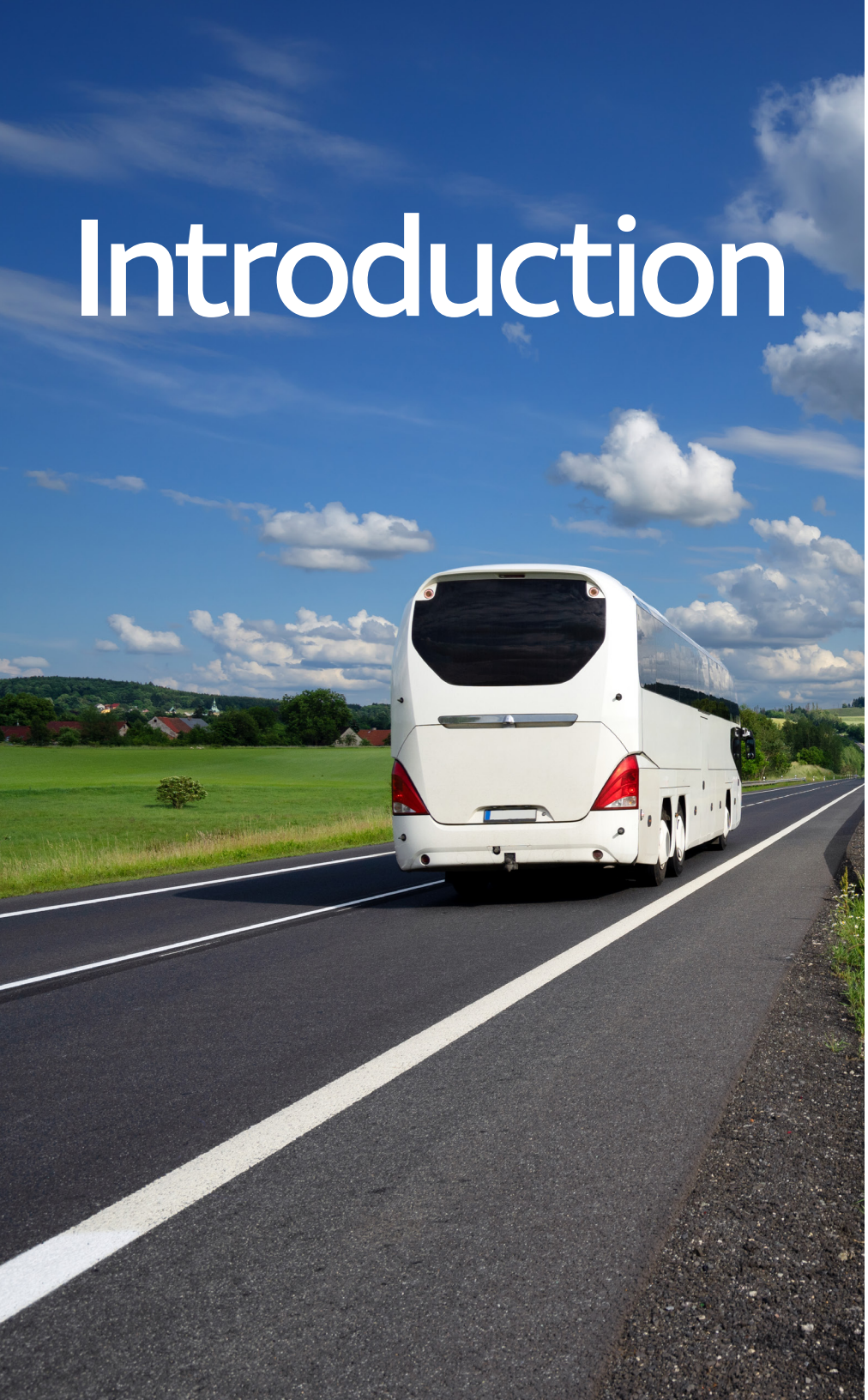
AT&T Business

5G and sustainability

Studies show how 5G can help improve energy efficiency and decarbonization in the transportation and manufacturing industries



Introduction

When it comes to your business, where does environmental sustainability fit into the picture?

Environmental sustainability is about reducing environmental impact, including the process of improving energy efficiency and reducing carbon emissions. It's becoming increasingly important in virtually all industries today—especially in transportation and manufacturing. Why?

The transportation sector is a major contributor to these emissions. Manufacturing, which is dependent upon transportation for the receipt of materials and shipment of goods, adds to this challenge through heavy factory emissions and energy consumption. Both industries have sharpened their focus on sustainability and are taking actions that will help them meet government regulations, align with decarbonization demands from consumers, and support energy-efficient, money-saving measures.

The 5G factor

5G connectivity is emerging as a game-changing technology for organizations pursuing environmentally-friendly practices and policies. In fact, two recent studies demonstrate how 5G technology can be a tremendous enabler of sustainability.

In this eBook, you'll discover that research conducted by Texas A&M University and Purdue Research Foundation reveal how 5G can benefit the transportation and manufacturing sectors—and by extension, other industries and the end users that rely on their products and services.

Many factors are accelerating the transportation and manufacturing industries toward sustainability transformations.

Challenge: regulatory landscape

Governments are rapidly adopting regulations to reduce each industry's carbon footprint. For example, in transportation, rules for greenhouse gas emissions will get progressively stricter to meet the milestones on the way to—

Net-zero by
2050
U.S. government's goal for transportation

30%
of new medium- and heavy-duty vehicle sales to be zero-emission by 2040[1]

Challenges & opportunities

Opportunity: tax incentives

Numerous tax benefits are waiting for those companies that adopt a variety of sustainability measures. For example, in the manufacturing industry, the recent Inflation Reduction Act offers the Advanced Energy Project Credit:

Up to
30%
in tax credits for investments in clean energy in manufacturing facilities and capabilities (such as energy storage systems, grid modernization equipment, energy efficiency, and greenhouse gas reduction retrofits)[2].

[1] Beth A. Viola, *"Biden Administration Unveils Blueprint to Decarbonize Transportation Sector,"* Holland and Knight, January 30, 2023.

[2] Elizabeth Sturcken, *"Leading companies are using IRA tax credits for clean manufacturing and technology. Are you?,"* The Environmental Defense Fund, June 7, 2023.

Challenge: pressure from investors and consumers

Consumers, business partners, and investors are demanding action and accountability from organizations when it comes to sustainability. For example, environmental reporting non-profit, CDP, notes that it has been approached by 746 investors with over $136T in assets and 340+ large purchasers with over $6.4T in procurement spend requesting the environmental data on thousands of companies. Why? They want their investment and procurement dollars to go to environmentally responsible companies, indicative of a now common mindset among markets and consumers.

Opportunity: savings

The business cases for sustainability measures are strong. They increase efficiency and reduce expenses. For example, in transportation, electric vehicles reduce costs in fuel, maintenance, and overall operations, leading to—

90% of fleet managers surveyed describe the future use of electric vehicles in the commercial fleet business as inevitable.

[3] *"Environmental transparency and accountability are vital for tracking progress towards a sustainable net-zero, deforestation-free and water secure future,"* CDP, accessed August 8, 2023.

[4] *"How Will Electric Vehicles Impact The Trucking Industry?,"* Fleet Complete Blog, January 3, 2022.

[5] *"Going carbon neutral,"* AT&T, Accessed August 14, 2023.

AT&T has met our goal that 50% of our suppliers (covering purchased goods and services, capital goods and downstream leased assets as a portion of spend) set their own science-based Scope 1 and Scope 2 emissions reduction targets by 2024."[5]

Scope 1 emissions: Direct emissions from sources owned or controlled by a company.

Scope 2 emissions: Indirect emissions from purchased electricity, steam, heat, and cooling.

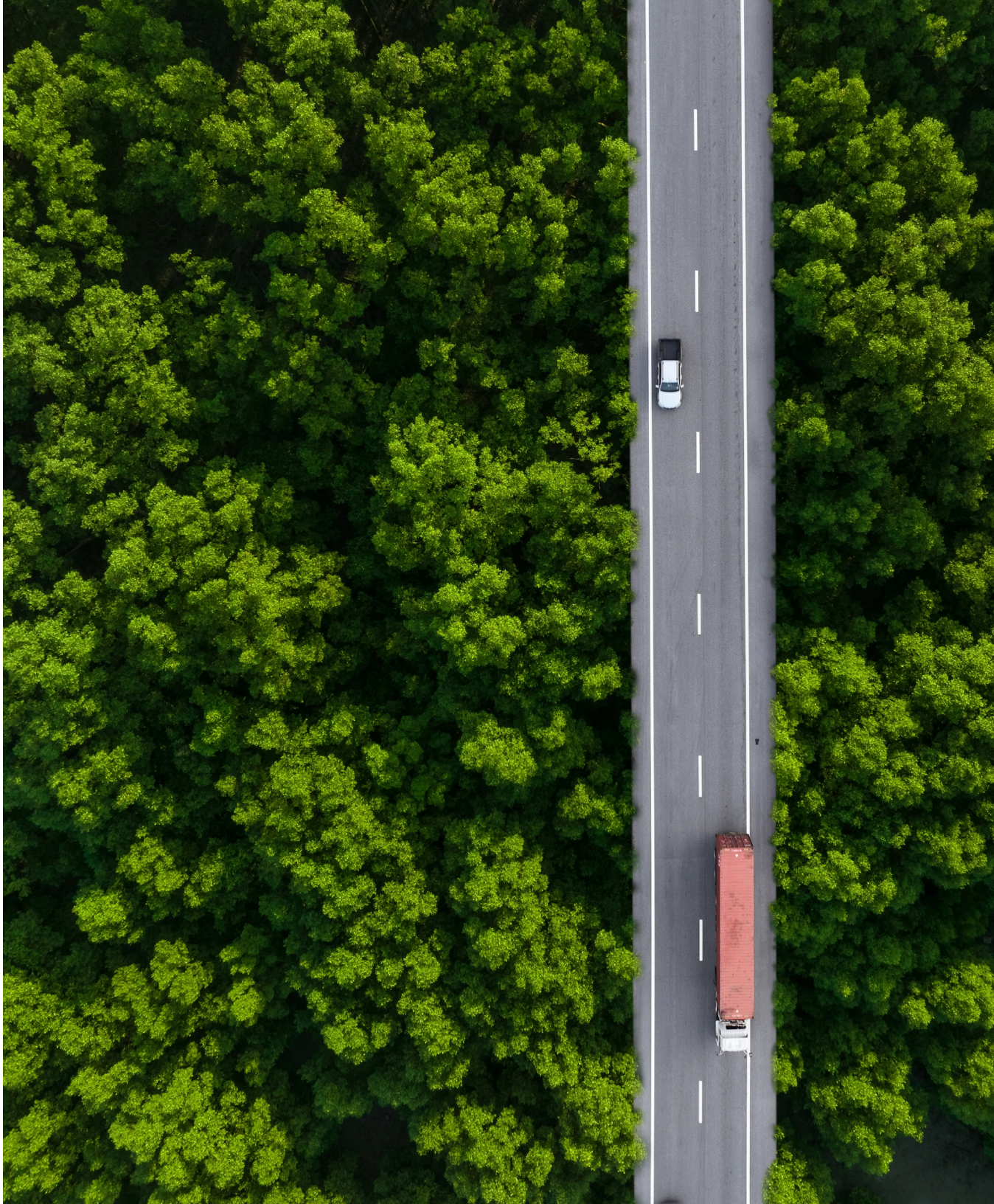
5G technology can enhance your sustainability efforts and initiatives

5G is the fifth generation of wireless communication technology used in cellular networks. It's designed to offer significant improvements in speed, latency, capacity, and network efficiency compared to its predecessor, 4G LTE. It enables new applications and use cases, such as autonomous vehicles and massive Internet of Things (IoT) connectivity, supporting ultra-low-latency operations.

Key benefits of 5G include:

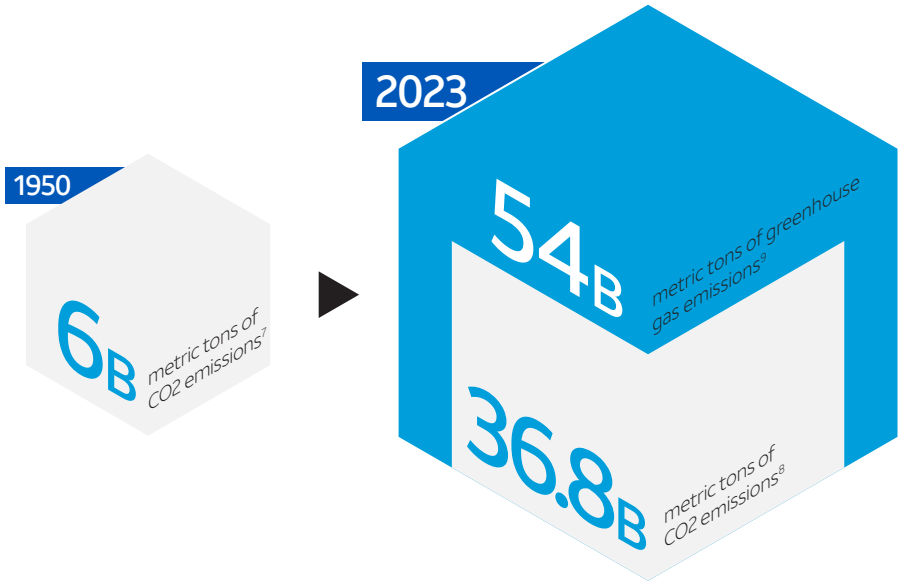
- Faster data transfer rates. Speed supports efficiency and performance.
- Lower latency (the time it takes for a signal to travel between devices). This improvement enables real-time communication and supports the success of time-sensitive applications.
- Increased capacity. 5G networks can handle more devices simultaneously, supporting the growth and performance of IoT devices and enabling better connectivity in densely populated areas.
- Enhanced reliability. 5G networks are designed to be more reliable, offering consistent connectivity and improved performance, especially in areas where network congestion is common.

As we'll see, two recent studies have demonstrated the potential of 5G to enable greater efficiency and reduce emissions.



A closer look: transportation

Transportation contributes to greenhouse gas emissions more than any other industry through burning fossil fuels. This includes personal transportation, as well as heavy-, medium-, and light-duty trucks that are used for commercial logistics.



"We don't expect anyone to buy electric trucks because they're worried about the environment or because they want to be nice. The beauty of these trucks is that fleets will be making the decision to deploy them based on bottom-line dollars and cents. There is a strong economic argument for the use of battery-electric trucks today."

Gio Sordoni, COO and co-founder of Thor Trucks[11]

[6] *"Sources of Greenhouse Gas Emissions,"* EPA.gov, Accessed August 3, 2023.

[7] Hannah Ritchie and Max Roser, *"CO_2 and Greenhouse Gas Emissions,"* Our World in Data, Accessed August 3, 2023.

[8] *"Global CO2 emissions rose less than initially feared in 2022 as clean energy growth offset much of the impact of greater coal and oil use,"* IEA.org, March 2, 2023.

[9] Fiona Harvey, *"Global greenhouse gas emissions at all-time high, study finds,"* The Guardian, June 8, 2023.

[10] Eric A. Taub, *"E.V.s Start With a Bigger Carbon Footprint. But That Doesn't Last."* The New York Times, November 7, 2022.

[11] *"How Will Electric Vehicles Impact The Trucking Industry?"* Fleet Complete Blog, January 3, 2022.

66 tons

Amount of greenhouse gas emissions produced by a typical internal combustion engine over the course of 200,000 miles of driving.[10]

However, when it comes to reducing carbon emissions, battery electric vehicles (BEVs) are lending a big hand.

50-70%

Amount of CO2 equivalents that BEVs save[10]

81%

anticipated reduction in greenhouse gases by 2050 thanks to BEVs[10]

Whether you own a single EV or an entire fleet, consider using renewable energy to power your charging stations. This can significantly reduce your environmental impact and build a more sustainable future.

What kind of vehicles are we talking about?

In the transportation industry, most vehicles will fall into the category of medium- and heavy-duty trucks and buses. These vehicles include:

- Heavy-duty pickup trucks
- Local delivery trucks
- Long-haul semi-trucks
- Refuse collection vehicles
- Public transportation buses

Fleets with electric vehicles cut maintenance spending on:

- Oil filters and oil changes
- Engine sludge
- Fuel injector cleaning and fuel filters
- Ignition coils and spark plugs
- Air intake filters, catalytic converter, timing belt, and muffler
- Brakes (reduced level of wear and tear thanks to BEV's single-speed transmissions and regenerative braking)

Texas A&M – RELLIS study: enhancing battery life and performance through 5G

If BEVs are good for environmental sustainability, then autonomous-capable BEVs are even better thanks to quicker decision-making, more efficient operations, and optimal energy expenditure. And autonomous vehicles operating on a 5G network show potential to be even more efficient.

A recent study conducted at Texas A&M – RELLIS highlights this fact. What’s more, BEVs running in autonomous mode in stop and start conditions reduced battery consumption by 1.3–1.9%.

Autonomous vehicles rely on high-speed, ultra-low-latency network performance to function well. And that’s where 5G comes into the sustainability picture. It’s fast, and it offers—critically—the lowest network latency.

As the Texas A&M – RELLIS report states, “For autonomous vehicles to be truly autonomous, significant help from infrastructure is needed … Our initial results are promising towards supporting the hypothesis that a lower network latency can lead to carbon savings [lower frequency of charging] for autonomous vehicles …”[12]

[12] Dr. Srikanth Saripalli, “Safe and Efficient Autonomous Vehicles using 5G,” Texas A&M University Unmanned Systems Lab, 2023.

A closer look: manufacturing

According to the World Economic Forum, "One-fifth of the world's carbon emissions come from the manufacturing and production sectors." This includes discrete and process manufacturing, for all sizes of business.

As the following stats show, there's a great opportunity to make sustainability progress in the manufacturing industry.

54%

of the world's energy sources are consumed by the manufacturing sector[13]

28.9%

of global CO2 emissions in 2022 came from the industrial/manufacturing sector[14]

[13] "Reducing the carbon footprint of the manufacturing industry through data sharing," World Economic Forum, Accessed August 3, 2023.

[14] Zhu Liu, Zhu Deng, Steve Davis, and Philippe Ciais, "Monitoring global carbon emissions in 2022," Nature, March 13, 2023.

Purdue study: 5G can boost sustainability in manufacturing

A study conducted by Purdue Research Foundation found that 5G (specifically AT&T 5G mmWave) connectivity can help manufacturing facilities run more efficiently and reduce their power consumption and carbon footprint.

In the study, researchers worked with a heavy industry manufacturing partner to model the operation of air compressors using 5G mmWave to monitor and adjust operation in near real time. When compared to the baseline operation, the power of near-real-time analytics and corresponding adjustments reduced the electricity usage and carbon footprint of the machine:

4.27

metric tons of greenhouse gas emissions avoided per day

1,558.55

metric tons of greenhouse gas emissions projected to be avoided per year[15]

If one machine in a single facility can reduce that many tons of greenhouse gas emissions, imagine how many tons might be eliminated by connecting every machine and device in one or multiple facilities to a high-performance 5G network.

“As a proof of concept,” the study notes, “this approach demonstrates how mmWave could be used and would be required for mass device applications in which 4G LTE and Wi-Fi would not have the capacity to support the traffic load.”

[15] Collin Stratton and Josh Pishon, “AT&T 5G Sustainability,” Purdue Research Foundation, January 1, 2023.

5G: the technology that can help power sustainability

The adoption of 5G technology can enable sustainability across a wide range of industries, not just transportation and manufacturing. And as we've seen, sustainability delivers a variety of benefits: cost savings in maintenance and efficiency, regulatory compliance, brand perception, and enhanced performance of machines and devices.

> It's easy to see why having the strongest 5G network possible can enable better, more consistent results in operational efficiency and productivity, energy consumption, and reducing greenhouse gas emissions.

The 5G studies summarized in this eBook reveal the mere tip of the iceberg in how 5G can positively impact our environment and business results. As industries adopt 5G and develop new use cases for it, it's easy to see why having the strongest 5G network possible can enable better, more consistent results in operational efficiency and productivity, energy consumption, and reducing greenhouse gas emissions.

AT&T 5G delivers

AT&T 5G is the network you depend on to stay securely connected.[16] AT&T 5G will not only enhance a growing smart ecosystem but it will also enrich and complement other networking technologies. It's the network that's built for business and that you can rely on. And we have experts that can help you deploy 5G, no matter the size of your organization or what industry you're in.

Discover more about how AT&T 5G can help your efficiency and sustainability efforts.

Why AT&T Business?

See how ultra-fast, reliable fiber and 5G connectivity protected by built-in security give you a new level of confidence in the possibilities of your network. Let our experts work with you to solve your challenges and accelerate outcomes. Your business deserves the AT&T Business difference—a new standard for networking.

[16]AT&T 5G requires compatible plan and device. Coverage not available everywhere. Learn more at att.com/5Gforyou