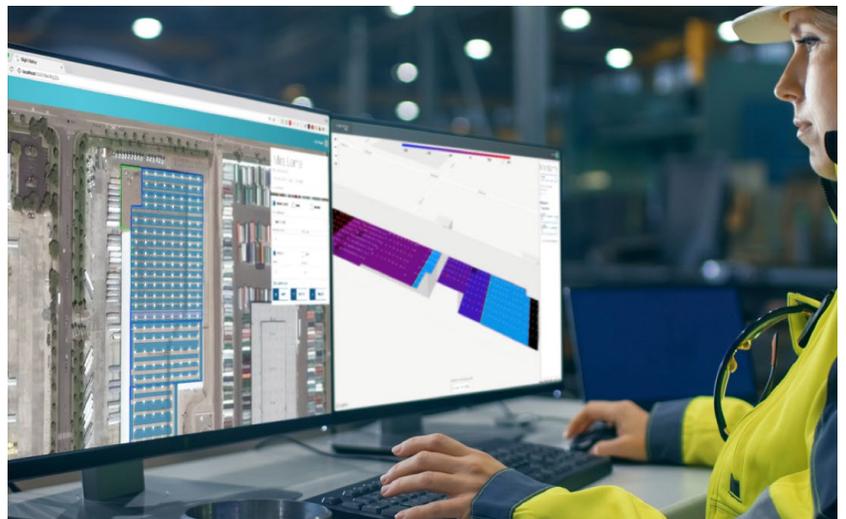


Reducing emissions. It's good for the world, and good for business.

Address climate change and propel your business
with broadband-enabled solutions



Technology for a better tomorrow

Science tells us that to avoid the worst impacts of climate change, the world must halve global emissions by 2030 and reach net zero emissions by 2050¹. This means eliminating billions of metric tons of greenhouse gas (GHG) emissions through improved efficiencies and increased renewable energy. Investors, customers, and other stakeholders are looking to businesses to employ responsible innovations to solve for climate change and meet global regulation standards. Broadband-powered solutions can help businesses accomplish these goals.

There's more than one upside to focusing on emissions reduction; when businesses implement technology solutions enabled by connectivity such as Internet of Things (IoT), 5G, and Edge Computing to reduce GHG emissions, they create efficiencies and unlock savings that can positively advance their organizations. A successful approach is two-fold and addresses both internal and external pressures: 1. Employ broadband-enabled technologies that can help reduce cost, operational waste, and emissions across the enterprise, and 2. Create new products that can drive revenue opportunities and help your customers reduce emissions. There is increasing demand for products and services that help customers operate in environmentally responsible ways.

Innovations in broadband-enabled solutions are helping businesses make changes that are good for the planet, and great for business. AT&T Business helps organizations integrate environmental responsibility and reduction of waste (including GHG emissions) into operations, products, and services. Read more about what the tech landscape looks like, where emissions regulation pressures are coming from, and how AT&T Business meets environmental considerations with innovations that work.

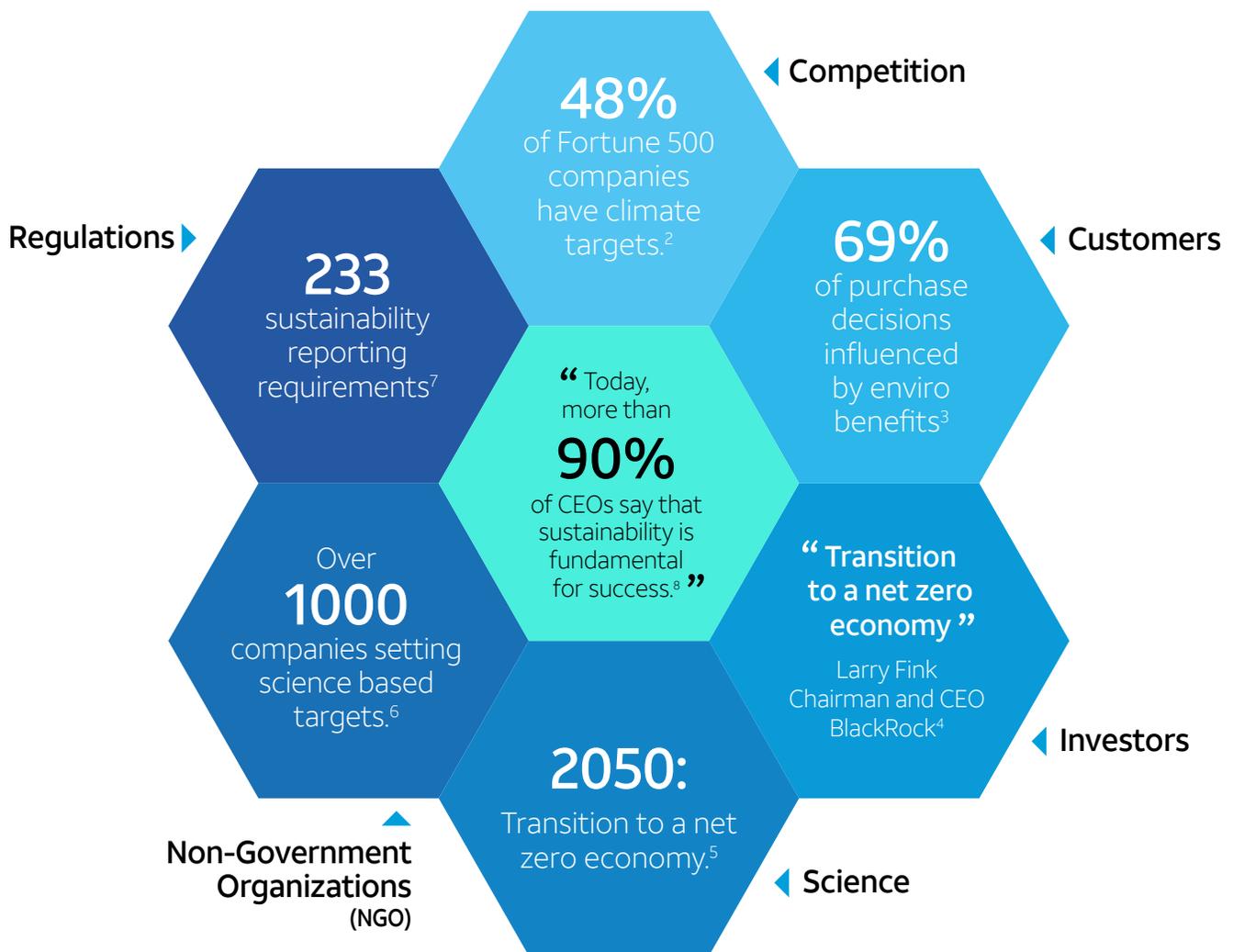


¹ IPCC report: [ipcc.ch/2018/10/08/summary-for-policymakers-of-ipcc-special-report-on-global-warming-of-1-5c-approved-by-governments](https://www.ipcc.ch/2018/10/08/summary-for-policymakers-of-ipcc-special-report-on-global-warming-of-1-5c-approved-by-governments)

Businesses are under pressure to reduce emissions

Risks and opportunities related to climate change are intensifying, and businesses continue to face pressure to make positive changes. Stakeholders are looking to businesses to reduce emissions and meet compliance regulations with global standards for climate protection. Whether driven by your competition, investors, customers, employees, regulators, non-government organizations, or Mother Nature herself, the need to develop a robust emissions reduction program is imperative.

The pressure to reduce GHG emissions comes from many sources:



² Worldwildlife.org/press-releases/report-fortune-500-companies-accelerating-renewable-energy-energy-efficiency-efforts

³ AT&T survey of 1001 small and medium size business responses in June 2018.

⁴ Blackrock.com/corporate/investor-relations/larry-fink-ceo-letter

⁵ IPCC report: ipcc.ch/2018/10/08/summary-for-policymakers-of-ipcc-special-report-on-global-warming-of-1-5c-approved-by-governments

⁶ Sciencebasedtargets.org/companies-taking-action/ (accessed September 10, 2019)

⁷ Carrotsandsticks.net/media/i3qpk1pm/carrots-sticks-2016.pdf

⁸ Forbes.com/sites/theyec/2018/08/20/why-sustainable-branding-matters/#26fe9dca5b6e

Broadband-enabled solutions can help companies reduce emissions and improve business performance

Current and emerging broadband-enabled solutions such as IoT and 5G/edge computing solutions can help businesses make better decisions, improve efficiencies, save money, reduce GHG emissions, and even drive new revenue, all while solving tough operational problems. Investment in the right technology can pay for itself.

According to analysis by the non-profit CDP, companies that shift to climate-friendly products or services have the potential to reap substantial rewards. How? Often the solution can drive cost reductions in a range of ways—by saving energy, fuel, or water costs, or by helping the company make better operational decisions—and in many instances, the company is able to recoup the original investment in incremental savings.

For example, the CDP report included information from 6,900 companies about the financial risks they are facing due to climate change. While the research group estimated \$970 billion was at risk, they also estimated \$2.1 trillion in benefits when those companies shift to climate-friendly products and services.⁹

Research indicates that by 2030, **information technology will provide benefits across the bottom line**, from reducing CO₂ and resource use to generating additional revenues and cost savings, plus wider societal benefits.¹⁰

IoT delivers near-real-time insights and analytics to nearly every aspect of your business, so you can make data-driven decisions that streamline processes, lower operating costs, and drive value. You can use IoT in an array of environmental sustainability efforts, and customer demand can even drive new revenue opportunities for your business. How?

Let's look at two ways businesses can improve performance through broadband-enabled IoT solutions: 1. Creating operational efficiencies, and 2. Developing innovative new products to answer consumer demand for reducing emissions.

Operational Efficiencies

- Equipment performance insights
- Optimized maintenance
- Reduced electricity, fuel, water, and raw materials

Connected Product Development

- Continuous monitoring enables resource efficiency
- Enables transition to renewable/smart energy
- Continuous data-enabled business models that support low emissions innovation

Actionable analytics

IoT delivers near-real-time insights and analytics to many aspects of your business, so you can make data-driven decisions that streamline processes, lower operating costs, and drive value. Add 5G, artificial intelligence, video analytics, augmented reality, and other technologies, and the sky's the limit on innovations in operations.

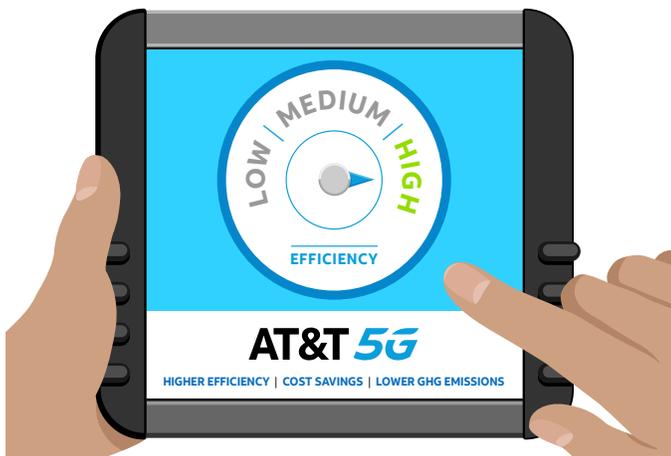
Smart building energy savings

AT&T IoT Professional services offers consulting services to implement Energy and Building Management Solutions (EBMS), an IoT-enabled system that has helped AT&T achieve an average of 8-10% savings in operating expenses overall including energy, maintenance, and facility or equipment repairs since 2012.

- Sensors and IoT technology collect and analyze data from energy and building and management systems.
- System can supplement existing legacy building management platforms or stand alone. No rip and replace.
- The data provides insights to improve facility and equipment performance through dashboards, fault detection, real time alerts, proactive maintenance, and benchmarking.

⁹ Bloomberg.com/news/articles/2019-6-04/companies-see-1-trillion-in-climate-risk-but-more-in-potential-reward

¹⁰ Smarter2030.gesi.org



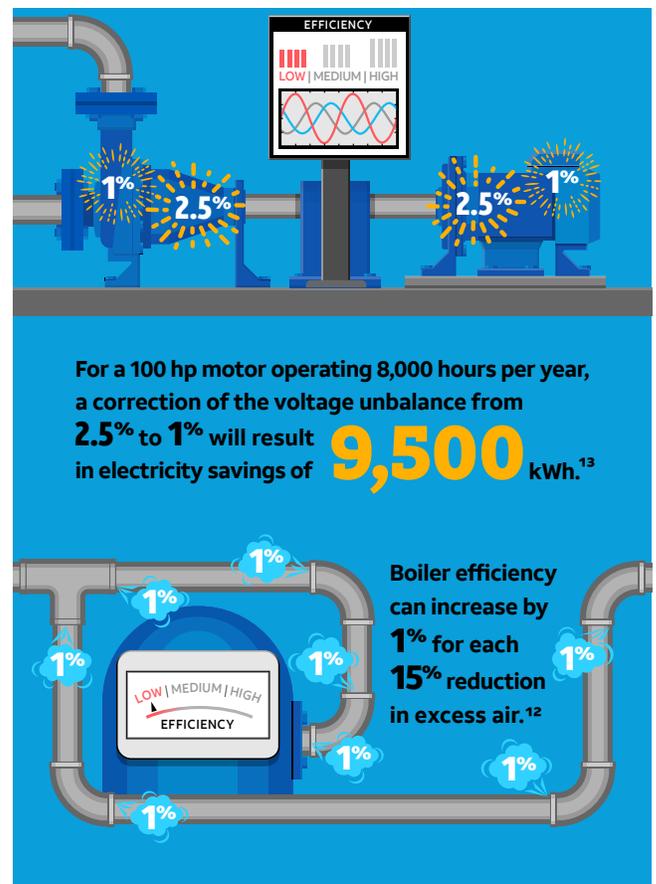
5G/MEC enables:

- Optimal equipment performance
- Predictive analytics to detect quality issues that could cause waste
- Video analytics to monitor equipment and identify energy-wasting issues
- Artificial intelligence, augmented reality, and machine learning to find leaks and ensure equipment is running optimally
- Near real-time device management to turn devices on and off to avoid wasted energy

AT&T 5G/MEC can help reduce manufacturing waste

Even small problems can waste money and energy at a plant. AT&T Multi-Access Edge Computing (MEC) is an on-premise edge solution that brings the power of AT&T LTE and 5G networks to deliver newfound levels of intelligence, control, reliability, security, and speed to your network architecture. 5G+ AT&T MEC can help you identify and address these inefficiencies and reduce emissions.

- **Inefficient compressors waste energy.** Every 2psi pressure rise resulting from resistance to flow can increase compressor energy use by 1%.
- **Boilers producing too much air waste energy.** Boiler efficiency can increase by 1% for each 15% reduction in excess air.¹¹
- **Voltage imbalances in a motor waste energy.** For a 100hp motor operating 8,000 hours per year, a correction of the voltage unbalance from 2.5% to 1% will result in electricity savings of 9,500kWh.¹²



Learn more at att.com/5Gportfolio

¹¹ Ibid

¹² "Energy Efficiency Improvement and Cost Saving Opportunities for the Pharmaceutical Industry," Ernest Orlando Lawrence Berkeley National Laboratory, March 2008, energystar.gov/sites/default/files/buildings/tools/Pharmaceutical_Energy_Guide.pdf

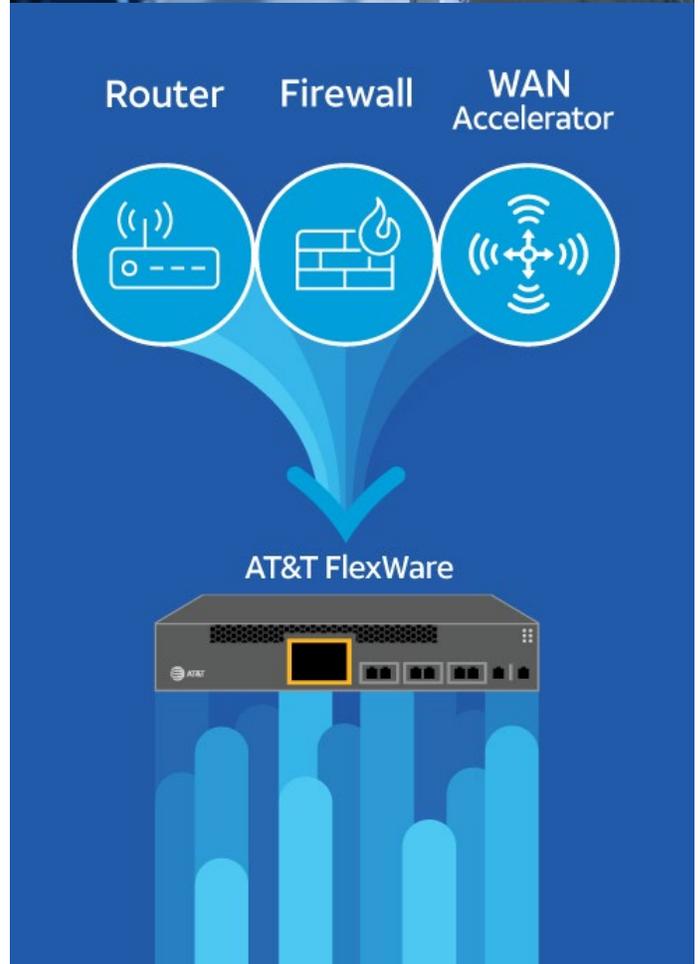
Tech can solve for environmental considerations in network equipment design

Business networks can be complex, capital intensive, and have hidden energy use. The AT&T FlexWareSM device was designed as one device to replace three: a router, firewall, and WAN accelerator. The 3-in-1 AT&T FlexWare device can reduce electricity use by 130 watts when compared to the average electricity use of a router, firewall, and WAN accelerator. As an example, if a business used 3,500 FlexWare devices to perform the functions previously performed by three devices, annual energy savings would be an estimated four million kWh, generating 2,200 metric tons of GHG emissions.

THAT IS EQUIVALENT TO:

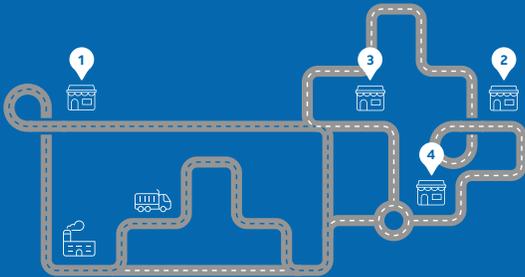
-  Taking **almost 475 cars** off the road
- OR**
-  Not burning more than **250,000 gallons of gasoline**
- OR**
-  Switching **almost 85,000** incandescent bulbs to **LED**

AT&T FlexWare not only simplifies and streamlines network deployment and management, but it can help lower capital expenses, reduce power and cooling requirements, and increase efficiency. Read the full case study [here](#).

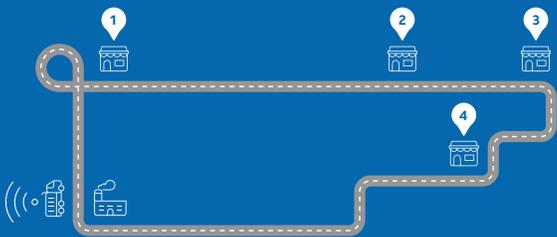


Reduce costs and create new efficiencies with fleet management and intelligent routing

Routing without Fleet Management



Routing with Fleet Management

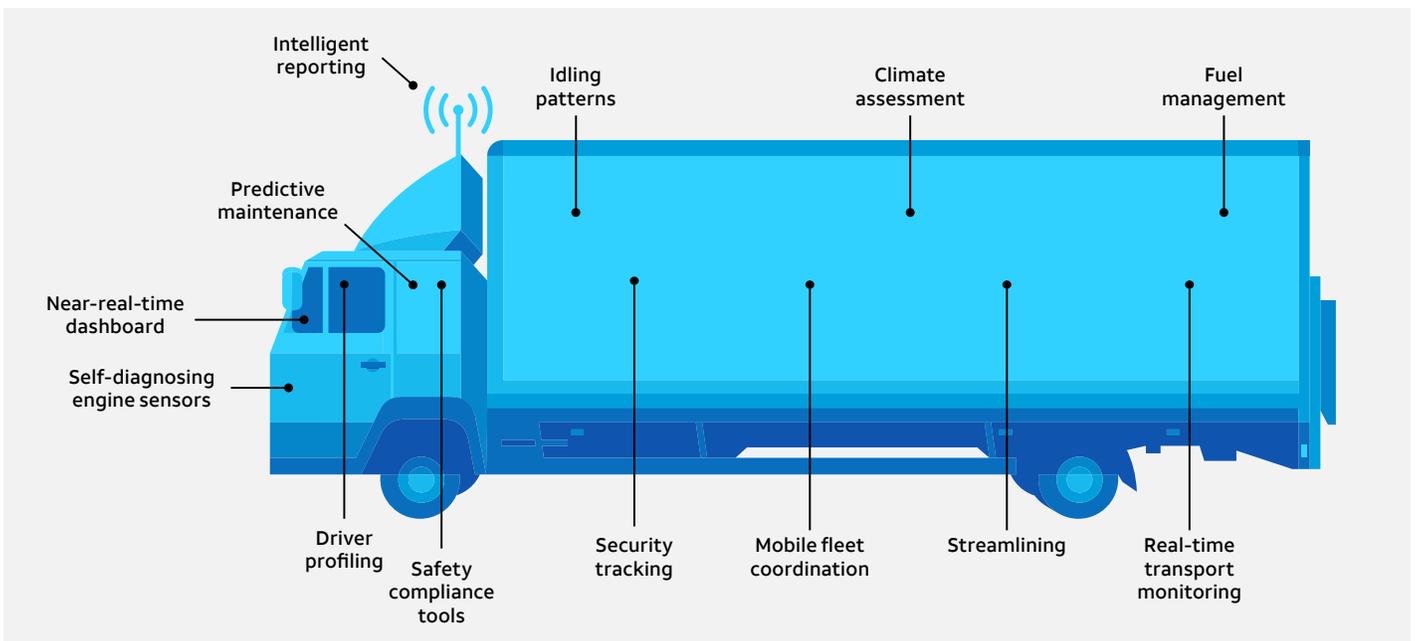


IoT and fleet telematics

AT&T fleet and workforce management solutions can help businesses reduce idling times and monitor driver behavior with an eye towards reducing fuel usage and associated GHG emissions. A fleet management system is a combination of sensors, devices, networks, and software that work together to unlock actionable data that can be used to optimize vehicle routes and reduce downtime with diagnostic tools. Monitoring and dispatch tools can help drivers bypass accidents and take shorter routes, for example.

Not only can telematics help you build and maintain a sustainable, fuel-efficient fleet, the practice can also help:

- Minimize vehicle abuse
- Lower maintenance costs
- Employ proactive maintenance to plan for scheduled downtime
- Reduce lifecycle costs and extend the life of equipment
- Ensure an acceptable level of asset availability and delivery of services
- Maintain uniform levels of asset usage



By 2025, there will be 80 billion devices connected via IoT.* IoT can power fleet management in planet-healthy ways.

* IDC: Worldwide Internet of Things Installed Base by Connectivity Forecast, 2017-2021.



Consumer demand drives innovative product development

As customers demand products that help them operate in an environmentally responsible way, it can present an opportunity for you to drive new revenue. For instance, adding IoT to enable performance monitoring of industrial equipment could create a new product line for energy-conscious customers looking to reduce energy costs. Similarly, adding IoT to a residential device could help a homeowner reduce wasted resources like water or electricity. AT&T Business helps companies bring such ideas to life—and to market.



“Nearly two thirds of consumers globally now ‘buy on belief,’ meaning they will ‘choose, switch to, or boycott’ a brand based on its stand on societal issues.”

Source: [2018 Earned Brand 2018 study](#), Edelman, Oct. 2, 2018.

Grind2Energy™ turns waste into energy

Grind2Energy, the food waste recycling system from Emerson, created an industrial food grinder to address costs and environmental impacts of food waste disposal from grocery stores, restaurants, and stadiums. Grind2Energy turned to AT&T for IoT connectivity and robust reporting to increase the scalability and market competitiveness of the system.

- The Grind2Energy solution turns food waste from commercial kitchens into nutrient-rich slurry that anaerobic digesters can turn into biogas, i.e., methane, that can be converted into electricity or heat—and fertilizer instead of greenhouse gas from landfills.

AT&T used expertise and technology, including its cellular network and the AT&T IoT platform, to develop the system that makes it possible for Grind2Energy to collect, organize, and analyze the data that helps Grind2Energy monitor operations via a central dashboard.¹³ Read the full AT&T Emerson Grind2Energy case study [here](#).



Total 2018 Annual Benefits of Grind2Energy Food Waste Diversion



Around 7,400 tons of food waste not dumped into landfills



1.3 million kWh of clean electricity generation, equivalent to powering 125 homes for a year



420 tons of fertilizer



Around 5,000 metric tons CO₂e avoided, equivalent to not consuming 570,000 gallons of gas

Unlike old methods that use inefficient pick-up schedules and generate GHG, Grind2Energy efficiently turns food waste into energy and fertilizer.

New Method: As-Needed Slurry Hauled to Digester



Old Method: Scheduled Waste Hauled to Landfill



¹³ AT&T 10x Case Study: Emerson's Grind2Energy 2018.

ChargePoint and AT&T connectivity: Driving a more sustainable environment

The shift to electric vehicle (EV) transportation can play an important role in transitioning to a low-carbon economy. ChargePoint electric vehicle charging stations use AT&T IoT and network connectivity to enable the use of electric vehicles rather than fossil fuel vehicles, thereby reducing the consumption of fossil fuels and associated emissions. With more than 37,000 places to charge on the AT&T network, ChargePoint stations help reduce GHG emissions.

IoT connectivity allows for remote software updates and enhancements of the charging stations, gives performance metrics, enables dispatch of repair techs, processes financial transactions, and monitors station efficiency 24X7. This creates an integrated experience for businesses and drivers, facilitating the transition towards more sustainable forms of transport, helping to decarbonize the transportation sector.

Estimated benefits of AT&T connected ChargePoint EV charging stations



Over 37,000
charging stations



Over 15.5 million
gallons of gasoline avoided

EQUIVALENT TO:



Almost 138,000
metric tons of CO₂e avoided

The shift to electric vehicle (EV) transportation with AT&T's highly secure, high-speed, and low-latency connectivity can empower businesses to reduce GHG emissions and mitigate climate change. Our existing connectivity solutions enable emissions reductions by reducing resource usage and spurring the transition from high to low-carbon energy across all sectors of the U.S. economy, including the highest -emitting: transportation, energy, manufacturing, and agriculture.

- As illustrated previously, **factory operators can monitor manufacturing equipment and fix energy-draining problems quickly**, saving electricity and costs and reducing associated emissions.
- Electric vehicle charging stations can use AT&T connectivity to help make charging easier, **speeding the transition to electric transportation with lower emissions**.
- Renewable energy production such as wind and solar can **use connectivity to optimize electricity production** and reduce maintenance travel.
- Smart buildings use connectivity to **monitor and control lighting, heating, and cooling** to reduce waste.
- Smart agriculture solutions can **help farmers optimize water and fertilizer use**, lowering the carbon footprint of food.

Technologies like 5G will transform industries and accelerate experiences, and AT&T Business has committed to keep looking ahead.

Why AT&T?

AT&T Business helps companies integrate GHG emissions reduction into operations, products, and services. We can help you meet your emissions reduction goals and unlock business value with solutions that fit your specific needs.

Talk to your representative and learn more about our smart climate solutions at att.com/smart-climate-solutions