Microsoft

Connecting building data for a more sustainable future

Good for your business, good for the planet

START HERE

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The environmental footprint of buildings extends beyond their walls

Buildings are significant contributors to the global climate crisis.

38%

of total global energy-related carbon dioxide (CO2) emissions comes from the buildings and construction sector[1]

To be on track to achieve net-zero carbon building stock by 2050, we need to reduce building sector emissions by **6 percent per year** from 2020 to 2030.[2] Meeting net-zero targets will require a radical shift in the way buildings are managed.

At the same time, businesses across industries and around the world are under pressure to reduce water consumption and minimize waste. As a result, building owners, real estate managers, and even tenants are considering how to reduce the environmental impact of the physical spaces they occupy—while reducing operating costs.

Scroll over to learn more

Operations

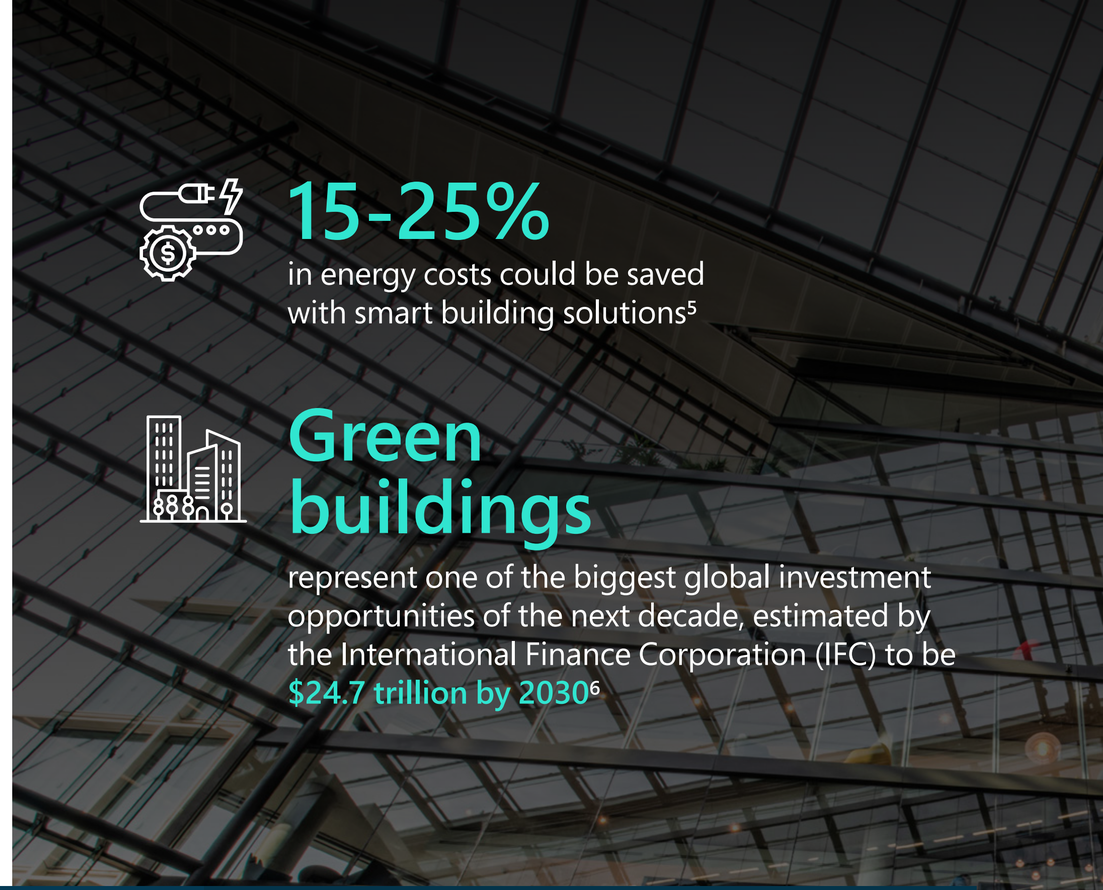
Water use

1, 2. "2020 Global Status Report for Buildings and Construction Sector," UN Environment Programme;
3. "Be a Hero With Lower Operating Costs in Your Building," FMLink
4. "Artificial Intelligence Can Prevent Enormous Amounts Of Damage And Water Loss From Building Leaks," Forbes, 27 June 2019;

Digital transformation is imperative—it's also an opportunity

Many businesses are taking steps to reduce energy consumption and carbon emissions and manage energy costs, and they're increasingly investing in renewable energy.

The greatest value, however, can be achieved by integrating and connecting systems to drive systemic change. Building owners can deliver new value for their business and for tenants by enabling insights and control over the performance and impact of building equipment. Full visibility into multiple systems helps us fully understand building environments. When we connect the building environments that make up communities, we can better manage entire ecosystems. And with AI-driven—or smart—technologies, we can optimize the infrastructure that connects them, conserving valuable resources and saving money.



15-25%
in energy costs could be saved with smart building solutions[5]

Green buildings
represent one of the biggest global investment opportunities of the next decade, estimated by the International Finance Corporation (IFC) to be **$24.7 trillion by 2030**[6]

Scroll over

Enhance efficiencies

Improve margins and revenues

Boost brand integrity

5. "Smart start for smart buildings," BIM Today, 26 November 2018
6. "2020 Global Status Report for Buildings and Construction Sector," UN Environment Programme

Propel your sustainability journey with the power of technology

The key is to harness data and unlock the insights you need. Digital technology solutions powered by the Microsoft cloud can help you understand your environmental footprint, determine how to reduce it, and adopt more sophisticated strategies as you reimagine your business with sustainability in mind.

Assess

Collect and connect data at the edge to assess your building's environmental footprint, establish a baseline, and create sustainability targets

Accelerate

Accelerate your progress using advanced analytics and virtual models to identify opportunities to minimize the impact of building systems from heating and cooling to lighting, voltage, water, and waste

Transform

Optimize systems with system integration, automation, or even autonomous controls – and identify additional opportunities to reimagine building operations

Discover how to drive sustainability in smart buildings

- Carbon
- Water
- Waste

Improve energy efficiencies and reduce your carbon emissions

According to the World Green Building Council, every building on the planet must achieve net-zero carbon emissions by 2050 to keep global warming below 1.5 degree Celsius, but less than 1 percent of buildings meet this standard today.[7] Digital technologies can help get us there.

Understand and optimize energy use and carbon impact. Smart technology can connect and aggregate data intelligence from legacy systems, enabling critical visibility into real-time energy use and trends through a single, unified platform. Add AI-driven insights into inefficiencies and how to address them, and you'll be armed with the intelligence you need to curb energy use and reduce carbon emissions. Smart solutions can even streamline management of operations responsively to maximize efficiencies, such as controlling lighting, ventilation, or security dynamically according to actual needs versus predetermined settings.

Use predictive monitoring to help manage equipment performance. Leverage Azure analytics to identify performance anomalies, reduce unplanned maintenance and equipment downtime, and reduce costs.

Explore grid-interactive efficient buildings and infrastructure to maximize energy efficiencies and help decarbonize the power sector, reducing indirect building sector emissions.

Let's expand on this…

Understand your emissions

Scroll over

Scope 1

Scope 2

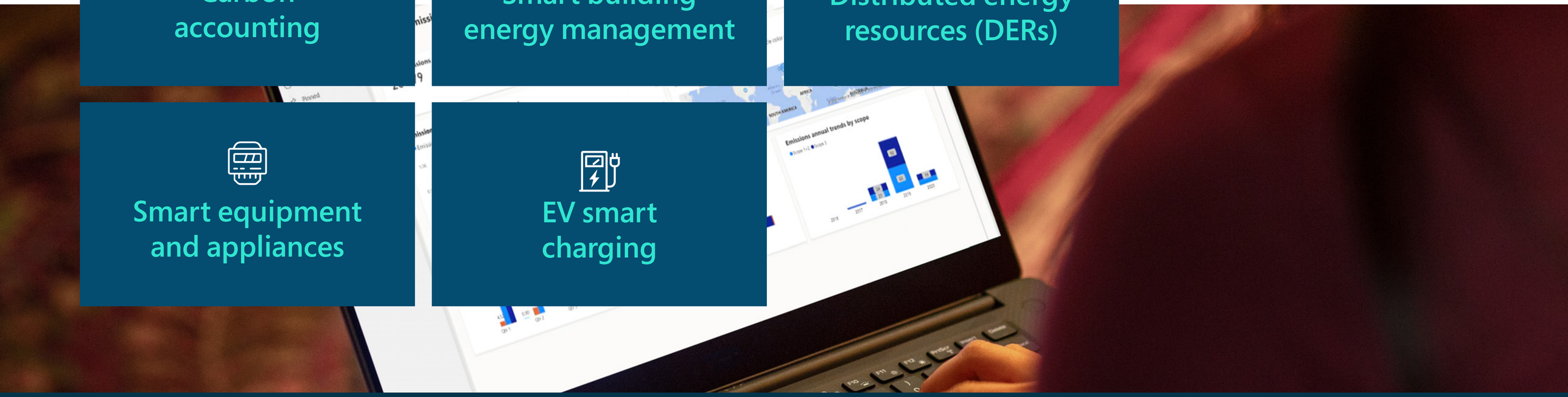
Scope 3

7. "The path to a greener future begins in our cities," World Economic Forum, 11 March 2021

Grid-interactive efficient infrastructure can help us collectively get further, faster

To offset the growing energy demand of buildings around the world, we'll need to do more than create energy efficiencies. Grid-interactive efficient scenarios can create more resilient buildings and help us transition to clean energy.

Scroll over



Carbon accounting

Smart building energy management

Distributed energy resources (DERs)

Smart equipment and appliances

EV smart charging

Customer Story:

Driving value for building owners and occupants

The situation

Brookfield Properties, one of the world's largest commercial office landlords, strives to apply leading-edge technologies to create more efficient, engaging spaces. New construction gave Brookfield a unique opportunity to transform its One Manhattan West property into an intelligent network with the help of Microsoft and Willow, a Microsoft partner.

The solution

A virtual model of the building gives operations managers and tenants the ability to monitor and manage energy usage, equipment function, lighting, temperature, and air quality. Azure Digital Twins and Azure cloud and edge services enable trend analysis and predictive maintenance to fine-tune equipment efficiencies, minimize energy waste, and reduce and report emissions.

The results

Operators can **better understand and manage assets** when equipped with real time data and analytics from an entire building or building portfolio.

Digital twins enable trend analysis and predictive maintenance to finetune equipment efficiencies, minimize energy waste, and reduce emissions.

Tenants gain insight and control of their own energy use through nested digital twins, to help reduce their own carbon footprint.

Customer Story:

Gaining visibility and control with AI

The situation

Microsoft continues to pilot sustainability solutions in our own operations. Our initial effort aimed to reduce energy consumption and carbon emissions on the Microsoft Redmond campus, spanning 125 buildings with disparate building systems across 15 million square feet of office and lab space.

The solution

We used an ICONICS solution running on Azure and extended with Power BI, Azure IoT, and Dynamics 365 Field Service to remotely monitor and manage buildings across the campus. The solution connects millions of data points daily from disparate systems, delivers clear intelligence, and enables remote device control.

Amplify efficiencies with AI

Microsoft Project Bonsai is a low-code AI development platform that creates intelligence for industrial controls by infusing knowledge from the people closest to complex systems.

In this case, once the AI understood the objective, variables, controller, and restrictions of a Microsoft HVAC system, it practiced in a simulated environment and returned recommendations to significantly boost the efficiencies of cooling towers and chillers.

The results

The initial solution resulted in a **6-10% annual reduction** in energy usage.

Full return on the initial investment was **achieved in less than 18 months**.

The team is using AI to compute outcomes beyond human capacity, which **could reduce energy use by an extra 15% annually**.

Customer Story:

Partnering to increase renewable energy

The situation

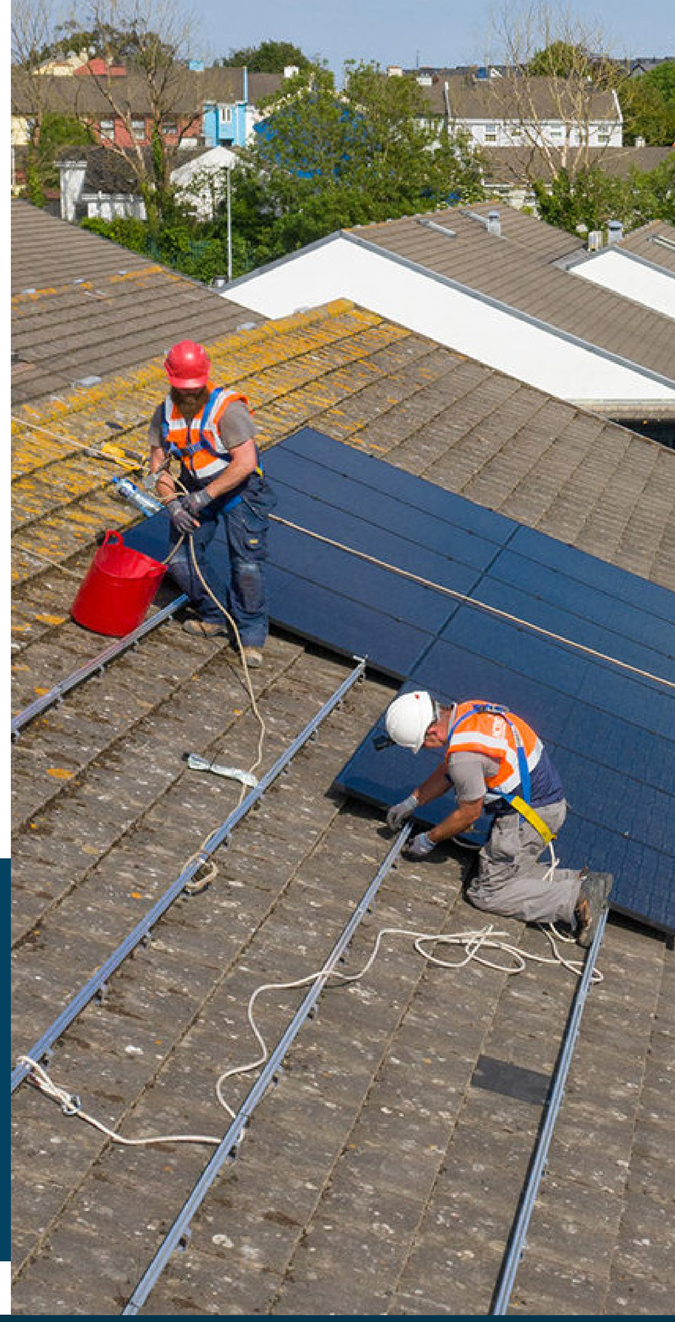
Large companies like Microsoft typically sign power purchase agreements with energy companies to power datacenters with renewable energy. The agreements provide financial guarantees needed to build industrial-scale wind and solar farms and connections to the power grid. Microsoft recently worked with an energy provider to test a new approach: installing solar panels to generate power while leveraging existing grid connections—and using IoT technologies to measure the accumulated energy production for carbon offset accounting.

The solution

Microsoft partnered with **SSE Airtricity**, Ireland's largest provider of 100 percent renewable energy, to install and manage internet-connected solar panels on 27 school rooftops. The solar panels generate power from sustainable sources for the schools and contribute energy for distribution across three Irish provinces through the electric power grid. SSE Airtricity uses Azure IoT to aggregate and analyze real-time energy generation data and determine the effect on carbon emissions.

The power of innovative partnership

More efficient energy management and carbon accounting is possible when building managers collaborate with energy partners and leverage digital technologies to generate and contribute power to the energy grid.



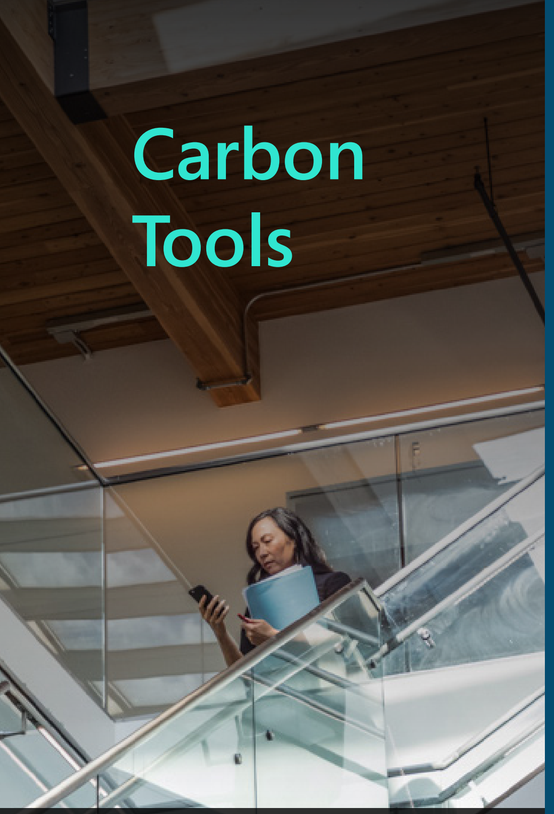
The results

The schools use **electricity generated by the solar panels,** which reduces their utility bills.

The panels are expected to produce **enough energy annually to power the equivalent of 68 Irish homes** for a year. The solution may abate **more than 2.1 million kilograms** (or 4.6 million pounds) of carbon dioxide emissions over the 15 years of the agreement.

Microsoft receives renewable energy credits for the generated electricity, which is applied to its carbon neutrality commitments

Carbon Tools



Check out

Smart Water Tools ▶

Smart Waste Tools ▶

Do more with

Microsoft Sustainability Partners ▶

Microsoft Sustainability Calculator ▶

Enhance your carbon accounting by quantifying the impact of Microsoft cloud services on your environmental footprint with the Microsoft Sustainability Calculator.

- Gain visibility across all scopes with a validated methodology and Power BI.
- Understand emissions trends associated with Dynamics 365 and Azure usage.
- Simplify carbon accounting and reporting to help meet your company's sustainability goals.
- Identify the root cause of emissions changes by watching actual and avoided emissions over time.
- Calculate how to further reduce emissions by moving additional applications and services to the cloud.

Azure Smart Energy Foundation Demo Stack ▶

Increase transparency into your buildings' energy use and carbon emissions with Azure IoT Central-based energy app templates:

- **Smart meter monitoring:** Monitor energy consumption and network status and identify trends to improve energy management.
- **Solar panel monitoring:** Connect, monitor, and manage your solar panels and track total renewable energy.

Embodied Carbon in Construction Calculator (EC3) ▶

Make more informed choices about building materials using the EC3 tool, which reveals the embodied carbon in materials so architects, engineers, and contractors can select materials with the lowest climate impact.

With more than 10,000 users, this free, Azure-based tool has a global database of carbon data for almost 5,000 individual building products across major material categories.

Reduce water consumption while improving water quality and availability

Digitally transform the way water quality is monitored in buildings to minimize health risks and manage costs.

Reduce water consumption by increasing visibility into water waste or potential leaks and remotely controlling water flow – while also reducing labor costs and saving energy (by reducing the workload on water pumps).

Use advanced analytics to accurately predict system performance – using AI to detect and classify sewer pipe cracks, defects, root infiltration, and attachments.

Customer story

Conserving water in water-intensive buildings ▶

Get started today with

Smart Water Tools ▶

Do more with

Microsoft Sustainability Partners ▶

Customer Story:

Saving water without sacrificing quality

The situation

Marriott has ambitious 2025 sustainability and social impact goals for its more than 6,500 global properties, including reducing its water intensity by 15 percent. The challenge is to maintain the highest standards of cleanliness for dishes, linens, and water, while driving operational efficiency and sustainability.

The solution

To protect their assets and guest experiences while delivering water and energy savings, Marriott worked with Microsoft partner Ecolab to adopt the Azure-based 3D TRASAR™ Technology for Cooling Water, which enables on-demand control and optimization of cooling systems, and the Aquanomic™ Low-Temp Laundry Program.

The results

Annually, Marriott **saves 3.34 billion liters of water**—equivalent to annual drinking water needs of more than 3 million people.

The laundry program extends linen life, reduces rewash, **saves water and energy, and reduces greenhouse gas emissions**.

Annual savings include **114 million kilowatt-hours of energy**, **21,500 metric tons of CO2e**, and 2 million pounds of waste.

Water Tools

Water Consumption Monitoring application template ▶

Remotely monitor and control water flow and valve pressure, manage alerts, and set up device commands to reduce water costs and waste with this Azure IoT Central app template.

Smart Water Navigator ▶

Adopt risk identification and response tools to help you understand your water risks and adopt sustainable water practices with this free platform from Ecolab.

Water Quality Monitoring application template ▶

Monitor water quality to improve health outcomes and environmental impact using this Azure IoT Central app template.

Check out

Carbon Tools ▶

Smart Waste Tools ▶

Do more with

Microsoft Sustainability Partners ▶

Reduce waste and improve the efficiency of waste management

The trash we discard pollutes our land, clogs our waterways, depletes our natural resources, and contaminates the very air we breathe. By connecting your data to the cloud, we can help you reduce waste and improve the efficiency of waste management.

Facilitate repurposing, reuse and recycling of materials and resources within your building or system operations using intelligent cloud solutions to help forecast and assess the use life of materials. Use only electronic equipment with energy-efficiency and circularity built-in, both for conventional equipment (workstations, network solutions, or cabling) and IoT sensors.

Maximize the efficiency of solid waste collection by dispatching operators at the right time along optimized collection routes or using advanced analytics to detect bin use or contamination.

Leverage Vision AI for advanced waste containment scenarios: deploying Azure-enabled IoT sensors in garbage containers that detect how full a bin is and send that data to the cloud where it can be shared in real time.

Customer stories

Circular economy in the built environment ▶

Improving waste collection ▶

Get started today with

Smart Waste Tools ▶

Do more with

Microsoft Sustainability Partners ▶

Customer Story:

Facilitating circularity of building materials

The situation

Construction and demolition produce one of the largest waste streams worldwide. More than 1.3 billion tons of building waste is generated every year; this amount is expected to double by 2025.[8] Dutch nonprofit **Madaster** saw an opportunity to reduce waste going to landfill by providing a public online library of registered and catalogued building materials.

The solution

Madaster developed an Azure-based technology platform that provides raw materials with an identity. The identity of materials is linked to a location and registered in a materials passport which can be generated for a building, construction object, or portfolio. Materials passports describe the materials used in a building, how and where they are used, their value, and approximately when they'll become available for reuse. The Madaster Platform allows materials to be recycled, resold, and reused to drive more sustainable construction decisions.

The results

Data are stored securely, intelligently enriched, easily shared, and managed through scalable cloud solutions.

Material passports make it easier to **reuse materials, minimize waste, and reduce the cost** of material consumption.

Visibility into materials' circularity potential helps managers **forecast costs and improve cost efficiencies** and return on investment.

8. "Construction Waste Market: Global Industry Analysis, Size, Share, Growth, Trends and Forecast 2017-2025," Transparency Market Research

Customer Story:

Improving waste collection with a mobile cloud solution

The situation

Office parks, hospital and school campuses, and cities are consistently challenged to improve sanitation services while reducing operating costs. When the **Los Angeles Bureau of Sanitation** needed a way to provide more effective services, they sought a digital solution to streamline waste demand and response channels.

The solution

The city created a system enabling residents to initiate service tickets to request waste cleanup. With Microsoft partner Spatial Wave, they used Microsoft cloud-based technologies to connect mobility, mapping, tracking, and dashboarding capabilities that streamline service request processing and enable managers to monitor KPIs.

The results

The team has **increased transparency and streamlined** service requests, responses, and oversight.

The spatially-enabled, cloud-based mobile solution **activates real-time deployment** of the closest crews to collect waste.

Data analysis enables the organization to **identify trends and forecast waste management needs**.

Waste Tools

End-of-life management and recycling ▶

Find out where and how to recycle your Microsoft devices. We partner with recycling organizations and work with our supply chain partners to facilitate the return and end-of-life management process of devices, batteries, and packaging.

Connected Waste Management application template ▶

Remotely monitor waste bin conditions such as capacity, odor, weight, and location with this Azure IoT Central tool.

Check out

Carbon Tools ▶

Smart Water Tools ▶

Do more with

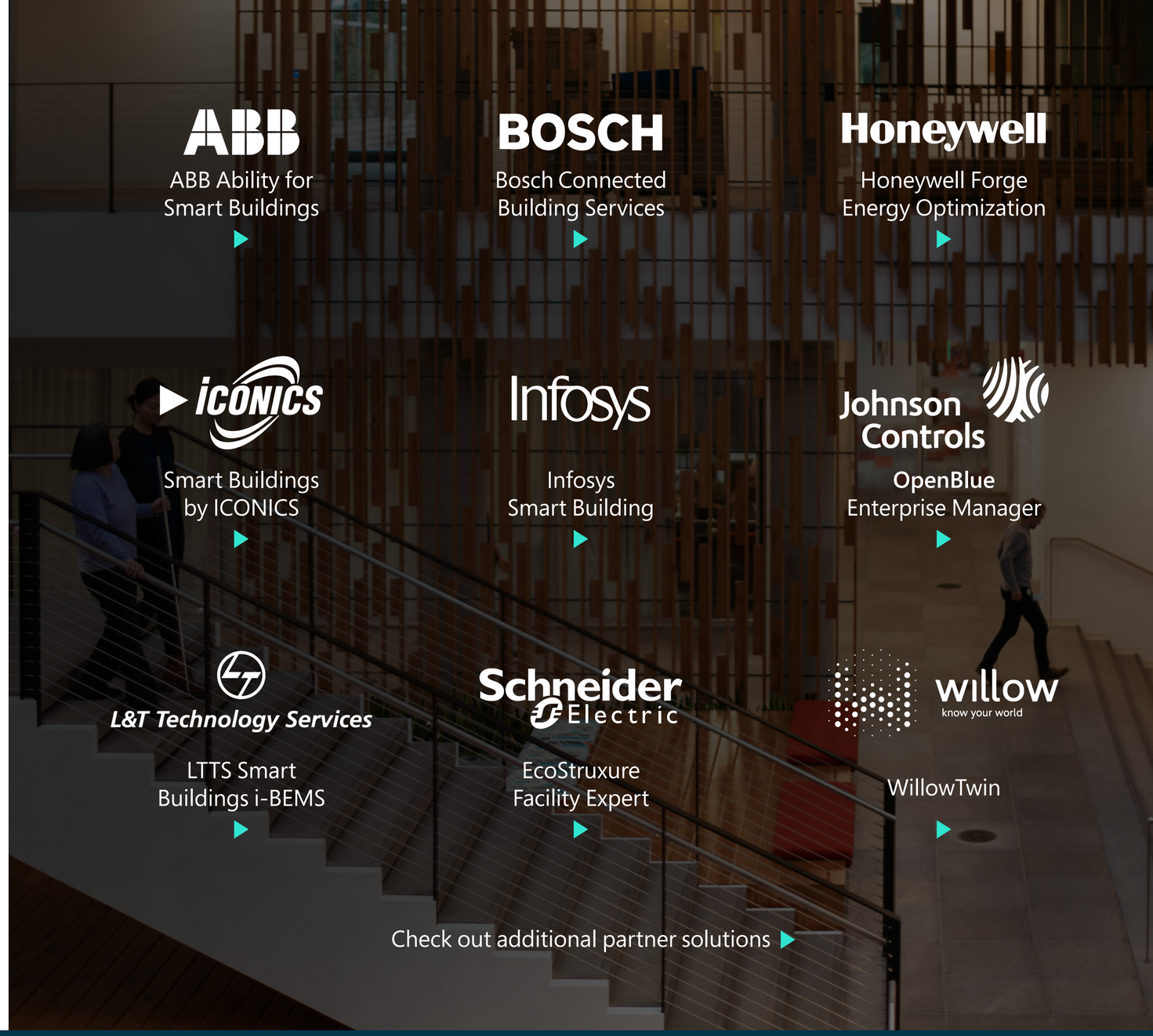
Microsoft Sustainability Partners ▶

Transform your business with experienced partners

While Microsoft provides the technology platform to support your sustainability journey end to end, our partners bring deep expertise about what to analyze, how to interpret data, and how to glean the actionable insights you need.

They offer off-the-shelf sustainability solutions as well as custom solutions and services that deliver greater efficiencies through integration, automation, or even autonomous controls.

Our list of partners with intelligent sustainability solutions is large and growing. Here are just a few who can help you reduce the environmental impact of your buildings and drive value in your organization.



Together, let's build a more sustainable future, harnessing the power of technology.

Microsoft