

Minimizing noise at our datacenter operations

When Microsoft joins a community to host a datacenter, we bring our commitments for a better world. Microsoft datacenter operations are key to our sustainability goals of being carbon negative, water positive, and producing zero waste by 2030.

Sound mitigation for datacenter equipment

Microsoft datacenters typically have four sources of sound: servers, employee vehicles and occasional truck deliveries, backup generators, and cooling equipment.

To manage this, we develop noise models for each datacenter site, customizing equipment locations to comply with legal and local zoning requirements. For all types of sound-generating equipment, we collaborate with engineering teams and local authorities having jurisdiction (AHJ) to understand and meet local noise regulations. To achieve this, we employ various sound mitigation strategies, including noise walls, buffers, mufflers, and more.

Understanding individual datacenter sound sources

Servers

Microsoft datacenters house servers, which are essentially high-performance computers used to store and process data required for operating cloud computing. These servers are the core of a datacenter and operate continuously. Since the servers are located inside datacenter buildings, it is not possible to hear them from outside.

Employee and delivery traffic

Unlike distribution warehouses, datacenters do not have around the clock truck traffic coming and going but might receive occasional deliveries of machinery, parts, or office supplies, once operational. With datacenters employing approximately 50 employees per building across a 24-hour period weekly, the parking lot traffic is also minimal.

Datacenter cooling

Microsoft datacenters house thousands of servers. Those servers generate heat during normal operation; to avoid overheating, the heat needs to be removed. The type of cooling selected is based on several factors like server type, climate, air quality, and water scarcity.

- **Indoor cooling equipment:** Sound can be heard inside of the building only.
- **Outdoor cooling equipment:** When outdoor equipment for cooling is needed, we work with engineering teams to understand and mitigate noise impacts using attenuation to meet the local regulation requirements.

Backup generators

Microsoft datacenters are designed to use generators as a backup power source. This solution ensures the online services provided by the datacenter can be accessed during electric power outages.

- **Infrequent usage:** While the backup generators run infrequently, we do need to perform brief monthly, quarterly, and annual testing.
- **Added attenuation:** We also add sound attenuation to the generator design. Attenuation is another way to describe how we insulate the sound waves from traveling. By taking this special measure, we reduce the sound to meet local noise ordinances. Additionally, typically, neighbors or community setbacks are hundreds of meters away and therefore the sound is insignificant.

Datacenter sound sources at a glance

Servers

Purpose—To store and process data required to operate the cloud

Sound—Insignificant

Employee and delivery traffic

Purpose—Keeping the datacenter online and secure.

Sound—Minimal

Backup generators within enclosures

Purpose—Keeping the datacenter online during rare events like a power outage

Sound—Attenuation and setbacks are added to meet local noise ordinances

Datacenter cooling

Purpose—Maintaining the servers at the required temperatures at all times

Indoor cooling equipment

Sound—Insignificant external sound as units are located inside the datacenter

Outdoor cooling equipment

Sound—Attenuation is added to meet local noise ordinances