About Air Economization:

The use of ambient outside air mixed with the internal building return air is referred to as "Free Cooling" or an "Airside Economizer". The principle operation of an airside economizer shown in the reference drawing is described below.

Ambient or outside air is drawn into the Air Handling Unit (AHU) through the outside air intake where it is mixed with the building's return air to maintain a supply air temperature, in the case of our Dublin data center that is 24° C. The supply air is then moved by a fan in the AHU through a Supply Plenum into the server room's cold aisle. That air is drawn through the servers where it absorbs the heat created by them. The air expelled from the servers then travels into the Return Plenum and this return air is now heated to approximately 35° C. It moves back to the AHU where it is again either mixed with the outside air or exhausted from the unit in what is referred to as exhaust air.

How is environmental impact minimized at the Dublin data centre?

Microsoft leverages a combination of factors to dramatically reduce the environmental impact of our Dublin data centre compared with traditional data centres. Prime factors are the cool weather conditions in the Dublin area and our use of air-side economization. Combined, these result in "free cooling"—chiller-free operations 100% of the year under normal operating conditions. This in turn significantly reduces water consumption and the use of chemicals required in treating cooling towers.

Regarding the climate, the temperature range year round in Dublin is between 23 to 80 degrees F (-5 to 27 degrees C), with maximum temperatures seldom rising above 75 degrees F (24 degrees C). Historical data indicates that the air temperature exceeds 75 degrees F an average of no more than three days per year.

The moderate temperatures allow Microsoft to use outside air to cool the facility using an approach known as air-side economization. Using this approach, air-handling units on the roof of the data centre draw outside air down into the facility to cool the server rooms, and then return hot air back out to the roof. We also employ adiabatic cooling—which vaporizes water into the air to absorb heat—and an air bypassing feature to improve operational efficiency and maintain constant room temperature regardless of outdoor conditions. Using these measures we are always able to keep the server space temperature in our Dublin data centre within the 95 degree F temperature limitation set by server manufacturers. (This helps us run the data centre server rooms at a high temperature than traditional 70-ish degree F levels used in the industry.)

Traditional data centres cool server rooms with chillers, which consume a great deal of power and water. They also require cooling towers, which in turn require chemicals to control scaling, corrosion, equipment fouling, and biological growth. No chillers are used in the Dublin data centre. The outside air that cools the facility is usually lower than the 95 degree F limit for our data centre rooms. And in the extremely rare event of external air quality issues such as a nearby fire, Direct eXpansion (DX) cooling will be used. DX is a simpler means of mechanical cooling that is normally used for residential, automotive, or light commercial applications.

Compared to other data centres of similar capacity that use chillers and cooling towers, the Dublin facility will use less than 1% of the traditional annual water consumption (both supply and waste water) similar facilities use and will improve PUE by approximately 50%.