

# A Career in Structural Engineering with Architecture

## Assoc Prof Ciaran McNally

# The Class of 2029....

- What will the world look like when you graduate?
- What will structural engineering look like?
- What are the key factors driving change?



# Climate Change

## NEWS

[Home](#) | [Coronavirus](#) | [Video](#) | [World](#) | [UK](#) | [Business](#) | [Tech](#) | [Science](#) | [Stories](#) | [Entertainment & Arts](#) | [Health](#)

[Science](#)

### Bill Gates: Solving Covid easy compared with climate

By Justin Rowlatt  
Chief environment correspondent

🕒 17 hours ago



Coronavirus pandemic



# Climate Change

- Right now: We add **41 billion tonnes of CO<sub>2</sub>** to the atmosphere every year
- Target: Net zero by 2050



# Context: Population Growth

- 10 billion people in 2060
- Living to 95+
- Working to 75+



# Context: Urbanisation

- 50% of population live in ill-prepared Mega-cities
- 75% in 2060
- Rising sea levels
- Unbalanced use of resources



# Sustainable Development Goals

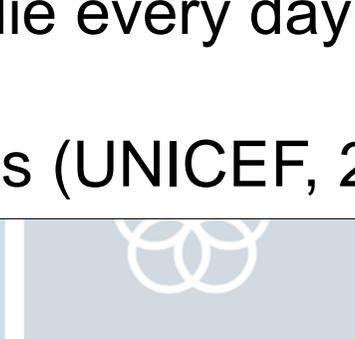
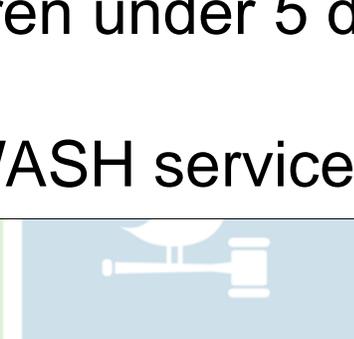
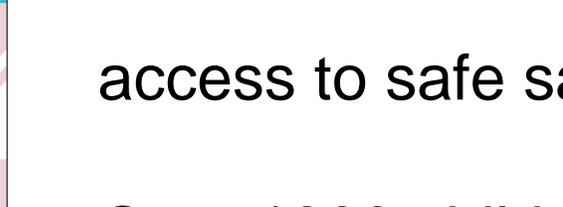


# Sustainable Development Goals



WASH: Water, Sanitation and Hygiene

- 2.2 billion people lack access to safe drinking water.
- More than half of the global population does not have access to safe sanitation.
- Over 1000 children under 5 die every day... due to lack of appropriate WASH services (UNICEF, 2024)



# Sustainable Development Goals

**7 RENEWABLE ENERGY**

- Europe now has 34 GW of offshore wind turbines
- Plan is to add 12 GW / yr to 2030
- Design & construction a major structural engineering challenge

**13 CLIMATE ACTION**

**14 LIFE BELOW WATER**

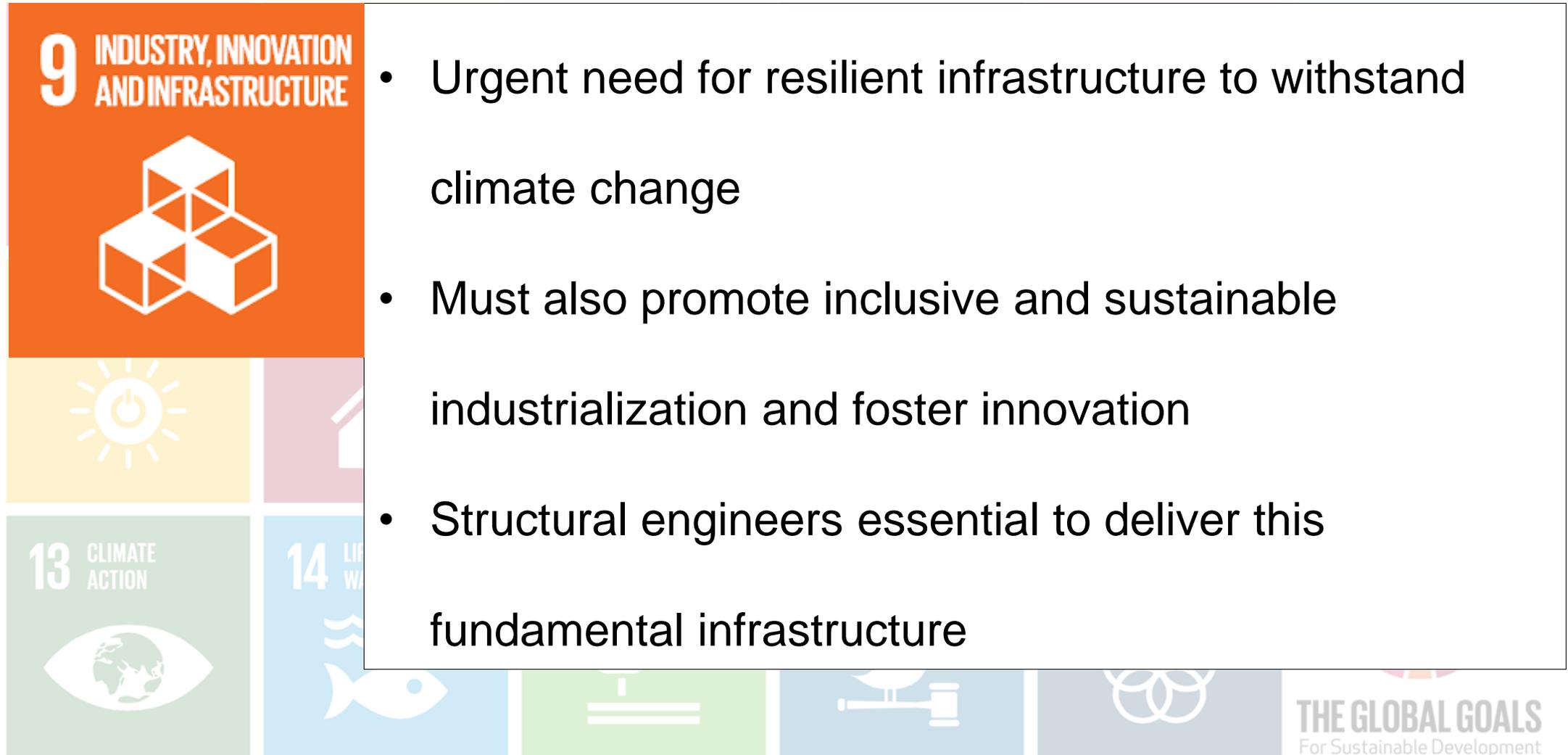
**15 LIFE ON LAND**

**16 PEACE AND JUSTICE**

**17 PARTNERSHIPS FOR THE GOALS**

**THE GLOBAL GOALS**  
For Sustainable Development

# Sustainable Development Goals



**9** INDUSTRY, INNOVATION AND INFRASTRUCTURE

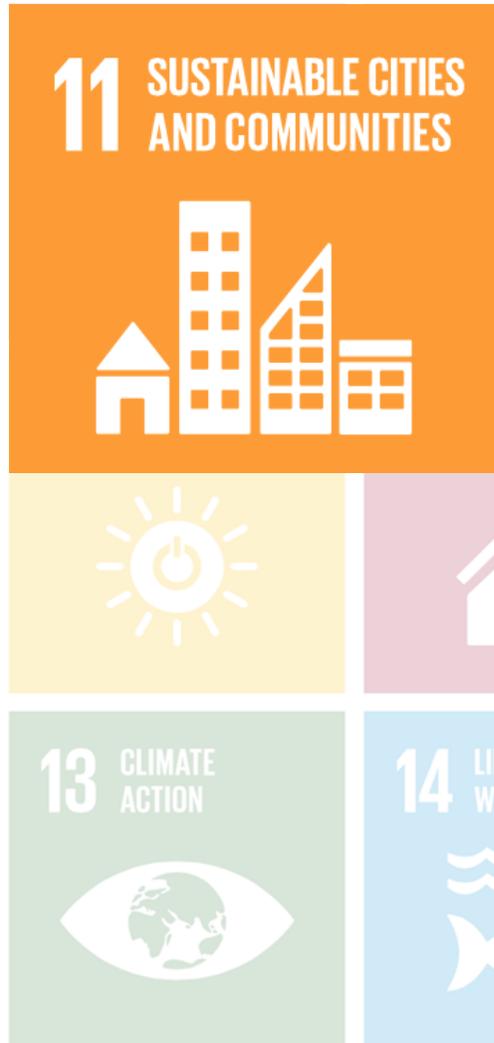
- Urgent need for resilient infrastructure to withstand climate change
- Must also promote inclusive and sustainable industrialization and foster innovation
- Structural engineers essential to deliver this fundamental infrastructure

**13** CLIMATE ACTION

**14** LIFE BELOW WATER

**THE GLOBAL GOALS**  
For Sustainable Development

# Sustainable Development Goals



- Cities are key to economic growth – contribute about 60% of global GDP
- Also responsible for 70% of global CO<sub>2</sub> emissions and over 60% of resource use
- Air pollution: 4.2 million premature deaths in 2016
- Only half of the worlds urban population has convenient access to public transport

# Sustainable Development Goals

**13 CLIMATE ACTION**

- 2023: 6.8% drop in GHG emissions (lowest for 30 yrs)
- We still need further annual reductions of 7.6%
- 2023: at least 26 million people affected by floods, hurricanes, wildfires etc and over 12,000 deaths

**13 CLIMATE ACTION**

**14 LIFE BELOW WATER**

**15 LIFE ON LAND**

**16 PEACE AND JUSTICE**

**17 PARTNERSHIPS FOR THE GOALS**

**THE GLOBAL GOALS**  
For Sustainable Development

# Sustainable Development Goals



[ABOUT GREEN BUILDING](#) [ABOUT US](#) [OUR GREEN BUILDING COUNCILS](#) [OUF](#)

[Home](#) > [News & Media](#) > [New report: the building and construction sector can reach net zero carbon emissions by 2050](#)

## New report: the building and construction sector can reach net zero carbon emissions by 2050

*With the support of more than 80 organisations, the World Green Building Council's new report describes actions to revolutionise the buildings and construction sector towards a net zero future, through elimination of embodied carbon emissions*

**23 September 2019 – London, UK** - As part of the 10<sup>th</sup> annual [World Green Building Week](#), the World Green Building Council (WorldGBC) has issued a bold new vision for how buildings and infrastructure around the world can reach 40% less embodied carbon emissions by 2030, and achieve 100% net zero emissions buildings by 2050.

Together, building and construction are responsible for 39% of all carbon emissions in the world[1], with operational emissions (from energy used to heat, cool and light buildings) accounting for 28%. The remaining 11% comes from embodied carbon emissions, or 'upfront' carbon that is associated with materials and construction processes throughout the whole building lifecycle. WorldGBC's vision to fully decarbonise the sector requires eliminating both operational and embodied carbon emissions.

# Fourth Industrial Revolution: Construction



# How is Construction Changing?



# Ireland's first 3D printed homes being built in Dundalk

Updated / Wednesday, 10 Jul 2024 20:30



# Building Handover



# Digital Twins



# Structural Engineering

- Responding to climate change is a huge challenge
- SDGs: Water treatment plants, wind farms, resilient infrastructure, public transport etc needed globally
- Digitalisation rapidly changing the construction industry