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# How Global Cooling is causing Global Warming

Presented by  
Molly Allington

Date:  
October 14, 2021

# The Cooling 'Catch 22'

## Energy used to cool

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10% of Global Electricity consumption comes from air conditioning

## Fossil Fuels burned

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The majority of our electricity still comes from fossil fuels so this electricity usage contributes ... of CO2 each year

## Global temperature rises

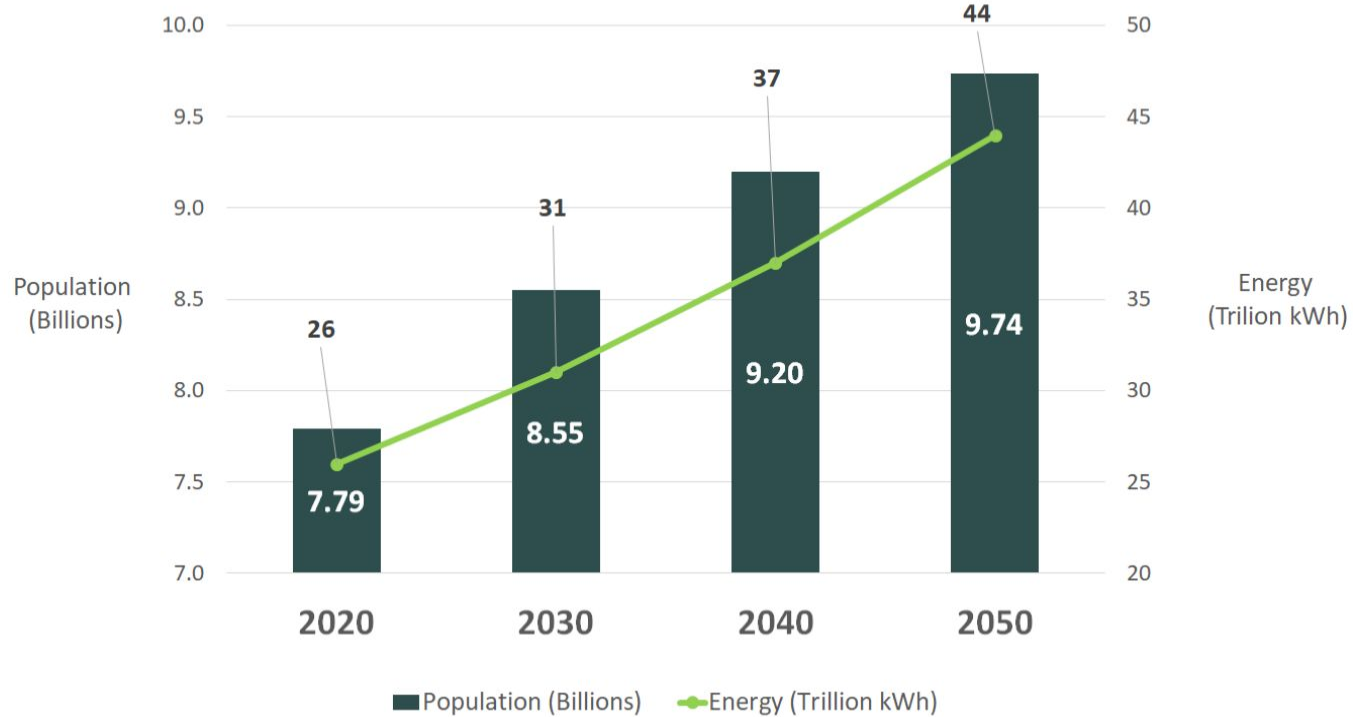
Releasing this CO2 into the atmosphere causes further warming of our planet, creating a greater demand for cooling indoor spaces

# By 2050...

Global Population will be nearly 10 billion

Energy consumption will rise to 44 Trillion kWh

Global temperatures are predicted to rise by at least 1.5 °C





# What about renewable energy?

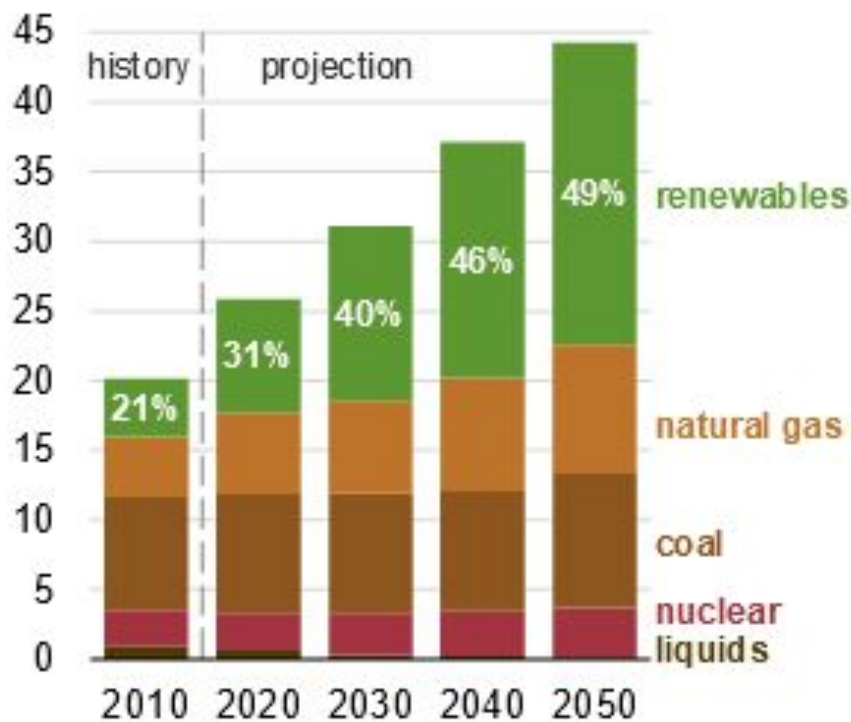
In 2020, 28% of our electricity came from renewables.

The worldwide consumption of energy is projected to increase by nearly 50% between 2018 and 2050, which will result in a 79% increase in electricity generation over the same time period.

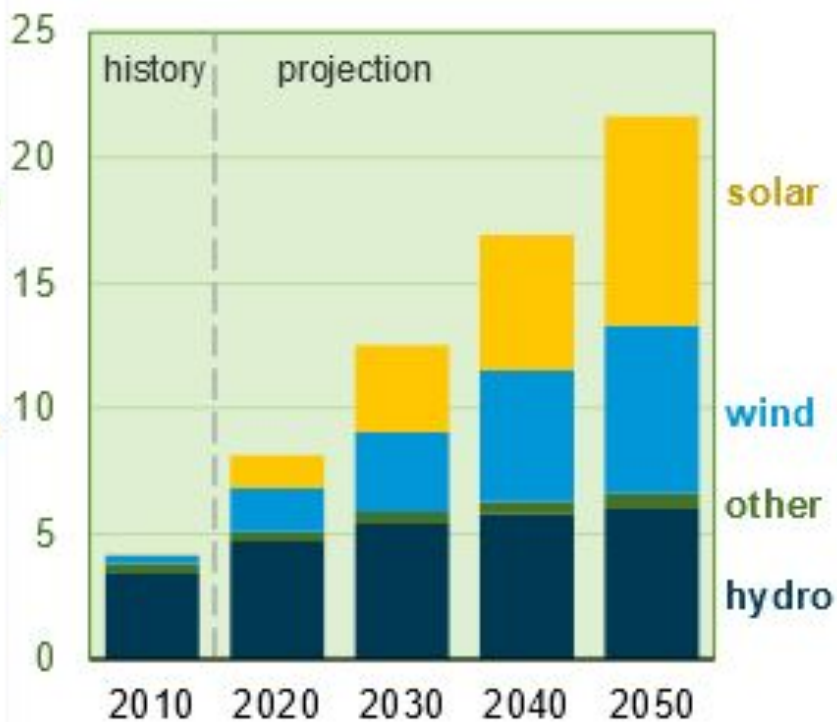
Although there is a huge amount of investment going into renewable energy, it is unlikely to be enough unless coupled with an increase in efficiency.

# World net electricity generation by fuel, IEO2019 Reference case (2010-2050)

trillion kilowatthours



trillion kilowatthours



# Three main types of passive cooling:



## VENTILATION

This Smart Facade system by Toprak reacts to temperature to let in either cold or warm air.

<https://akillicephe.com/en/urunler/tek-kanalli-urun>



## SHADING

There are quite a few electrochromic and thermochromic films on the market that provide responsive shading for buildings.

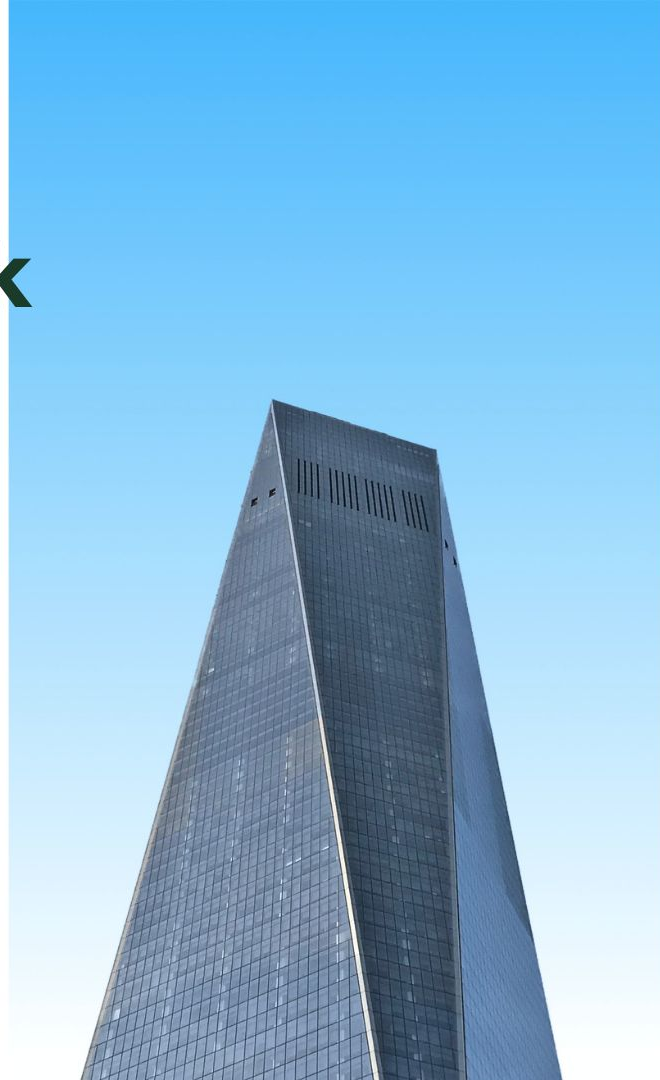


## THERMAL MASS

This is usually coupled with ventilation and shading. Heat typically passes slowly through buildings with high thermal mass, keeping cooler for longer.

# Windows are a weak point in building design

Green Tech South  
West

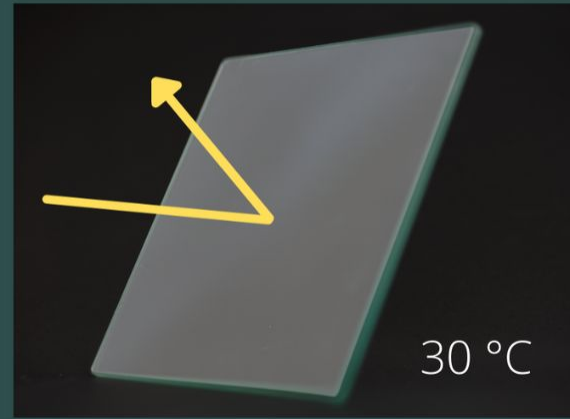
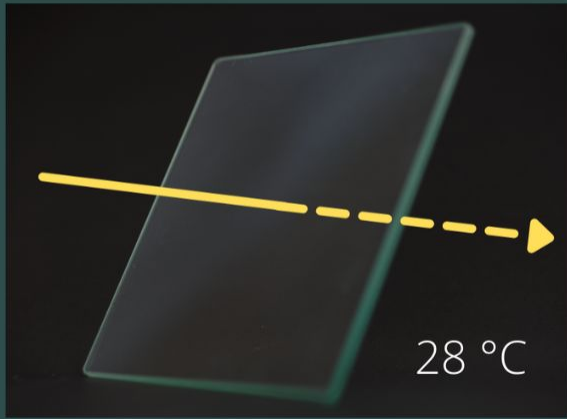


48% of a building's heat gain comes from the windows, this results in offices reaching uncomfortable temperatures 22 days per year.

Due to current architectural trends, modern buildings have very high window to wall ratios of up to 75%.

85% of current UK building stock is expected to remain standing by 2050. We need retrofittable solutions that can reduce heat gain in warm weather and prevent overheating.

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## Albotherm's Solution

We are developing coatings based on novel polymer chemistry that reversibly transition from transparent to white, passively cooling the surfaces they coat by reflecting solar radiation in hot weather. We can control the trigger temperature this transition occurs at, between 18 °C and 45 °C. Our technology works without electrical input, cutting down carbon emissions associated with air conditioning and removing our reliance on fossil fuels.






**"Our coatings are cheaper and easier to retrofit than similar technologies."**

Similar technologies on the market are very to retrofit as they require electricity input to induce the response. They are also prohibitively expensive, costing between £150/m<sup>2</sup> and £800/m<sup>2</sup>. Our technology can be easily spray coated and costs in the < £100 / m<sup>2</sup>.



**"Our technology can reduce carbon emissions associated with air conditioning."**

Using Albotherm's responsive window glazings in this sector could reduce heat gain by up to 58% which in turn would reduce energy consumption from air conditioning by 10%. This would prevent 3,800 tonnes of CO<sub>2</sub> being emitted each year, equating to 15,200 hours of flight time in a Boeing 737



**How did we  
come up with  
the idea?**



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# Greenhouse Application

Greenhouses are designed to extend our growing seasons by increasing growing temperatures during colder months, hence the term “The Greenhouse effect”, however they are consequently prone to overheating in the Summer months.

Currently, farmers turn to 'shade paints' to help keep crops cool. These do reduce temperatures but also block light by a fixed amount for the whole hot season, limiting the amount of crop you get.





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# Our Technology...

**Reversibly transitions from clear to white** as outdoor temperatures increase.

**Saves growers time** in applying and removing shading each year.

**Allows the full spectrum of PAR light** to pass through on cooler days, maximising crop yield.

**Easily retro-fitted and tunable** to transition temperatures between 18 °C and 45 °C.





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