

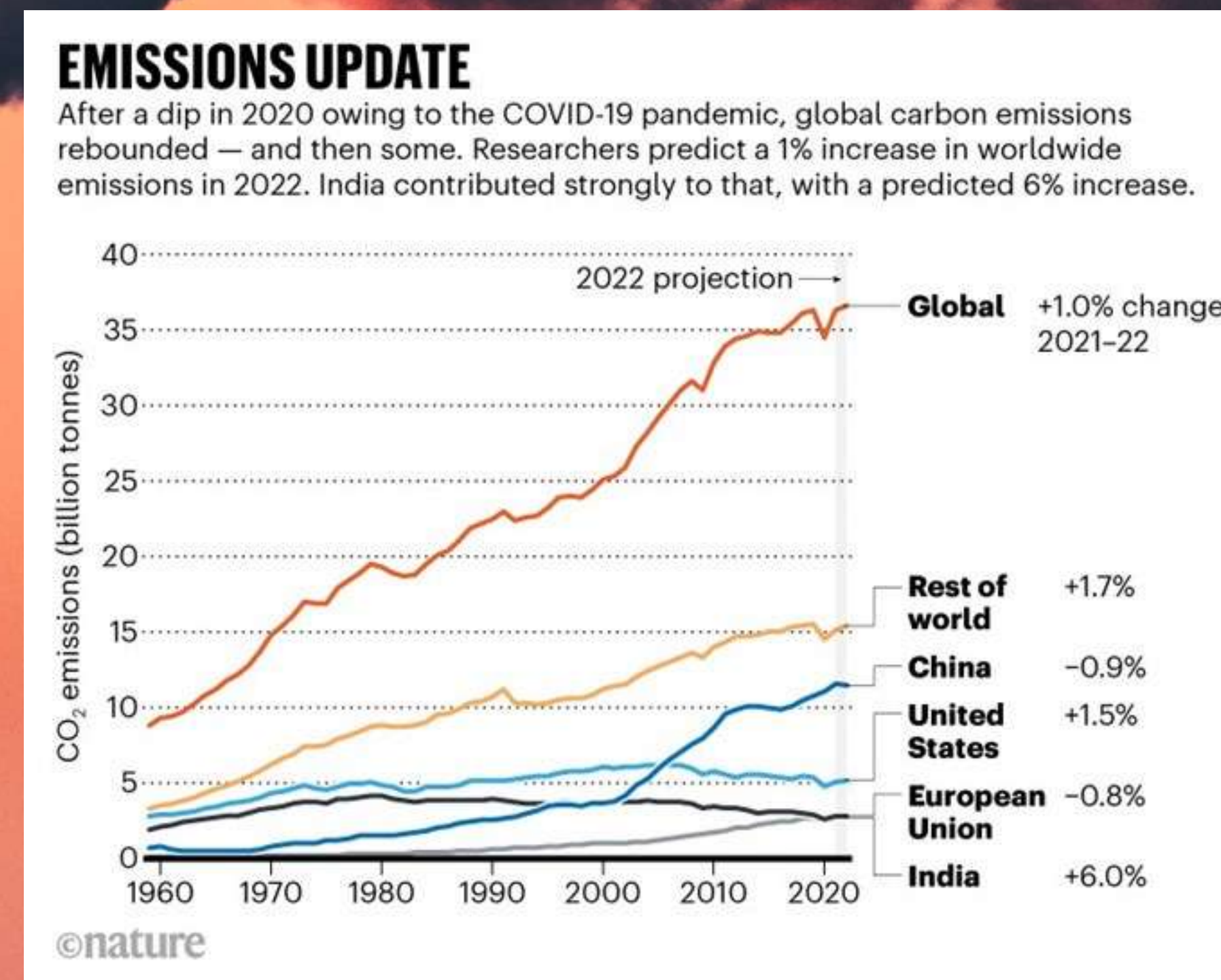




## How much CO2 is emitted per year?

Total CO2 emissions are at 37 Giga tons / year = 37 billion tons / year

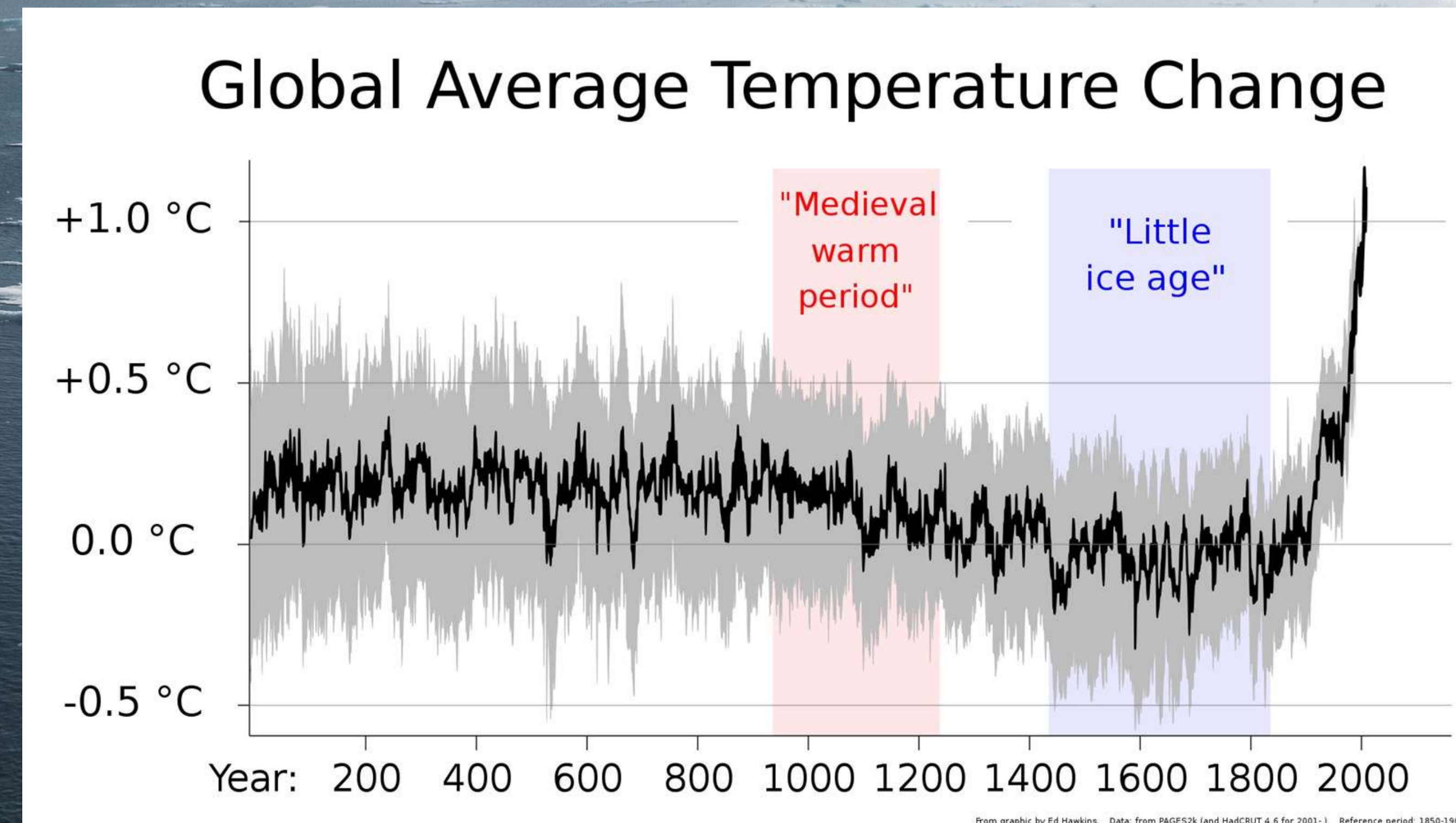
China = 11, USA = 5, Europe = 2.8, India = 2.7, RoW = 14.8



# 37 billion tons/year

Number to remember

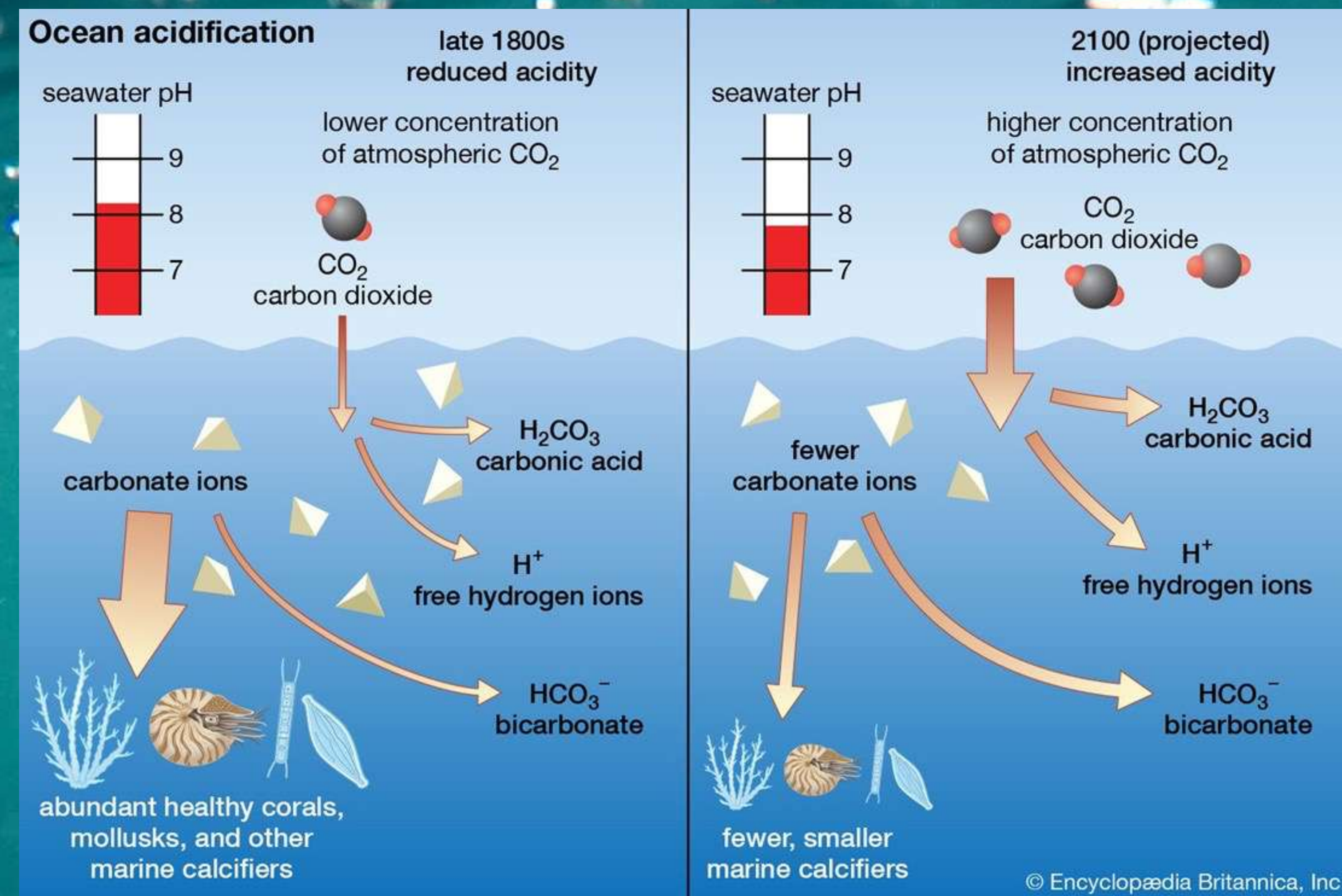




**+1°C achieved in 2017**  
**New target < +2°C**



Another side effect of the higher CO<sub>2</sub> levels is  
**ocean acidification**





Plastic pollution is pervasive





**A leaner, cleaner, healthier and sustainable future**

**drives changes in the Materials Cycle**





**Petro- and other natural resources**



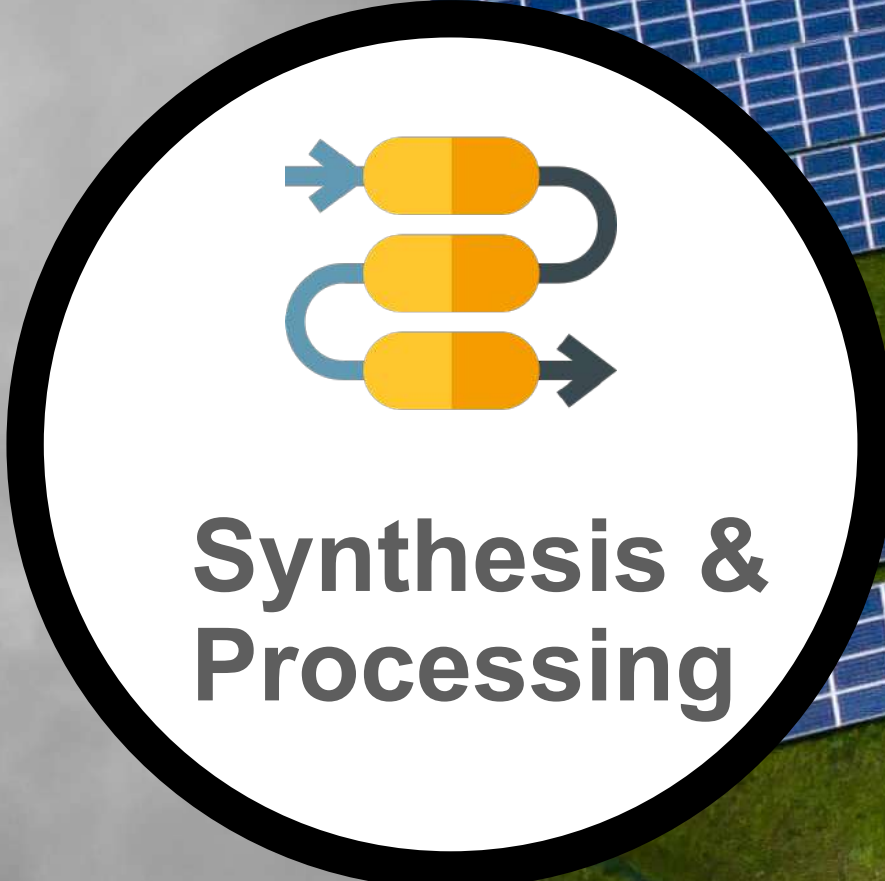
**>> Renewable Resources  
(ie. Bio & Synthetic Bio)**







Discovery by trial & error, widespread environment damage



>> Discovery by machine learning,  
less carbon (Decarbonization),  
use of clean energy (Electrification)







Properties & costs



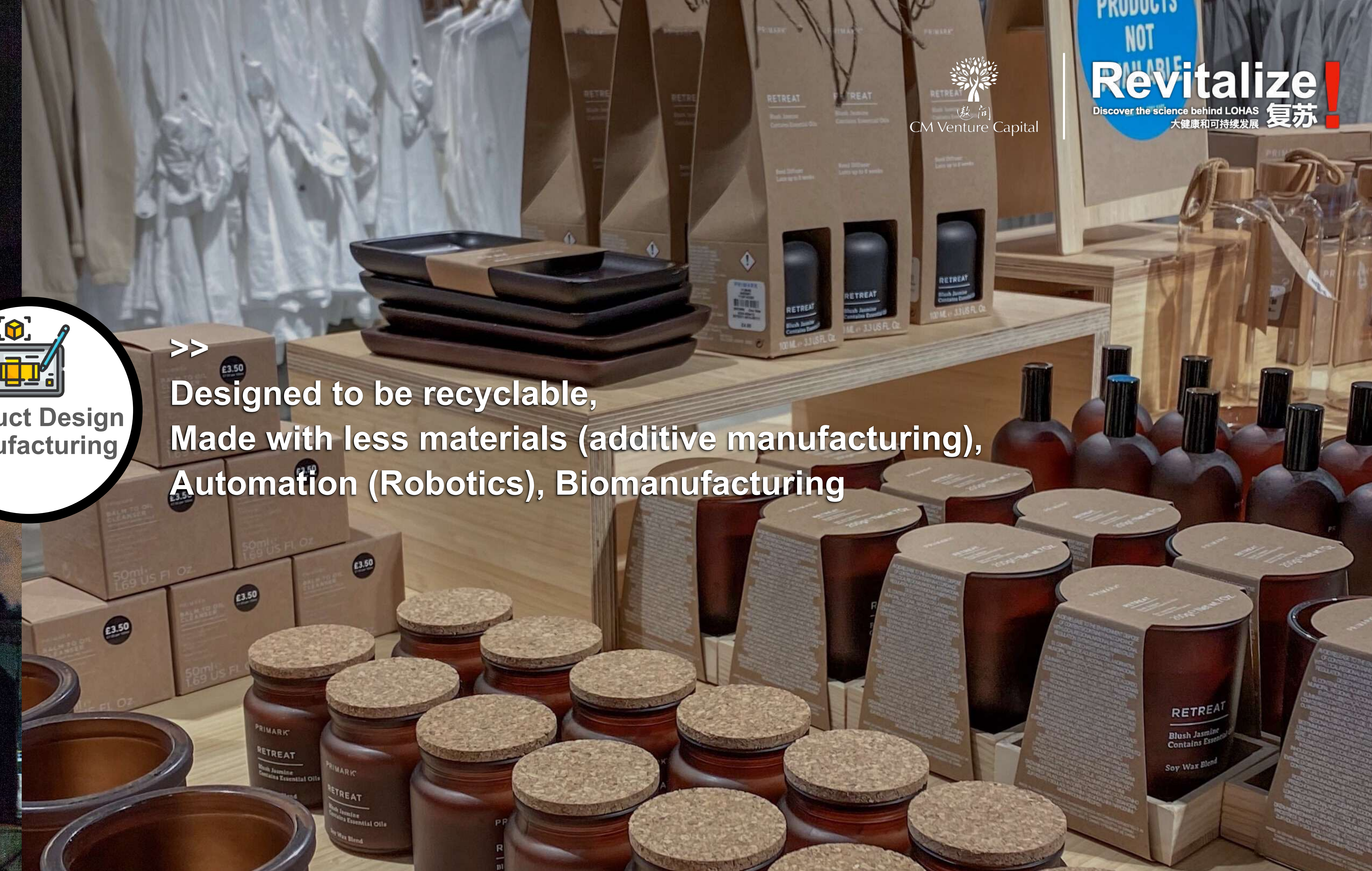
>>

New material & new processes  
with lower carbon footprint





Mass manufacturing at lowest cost



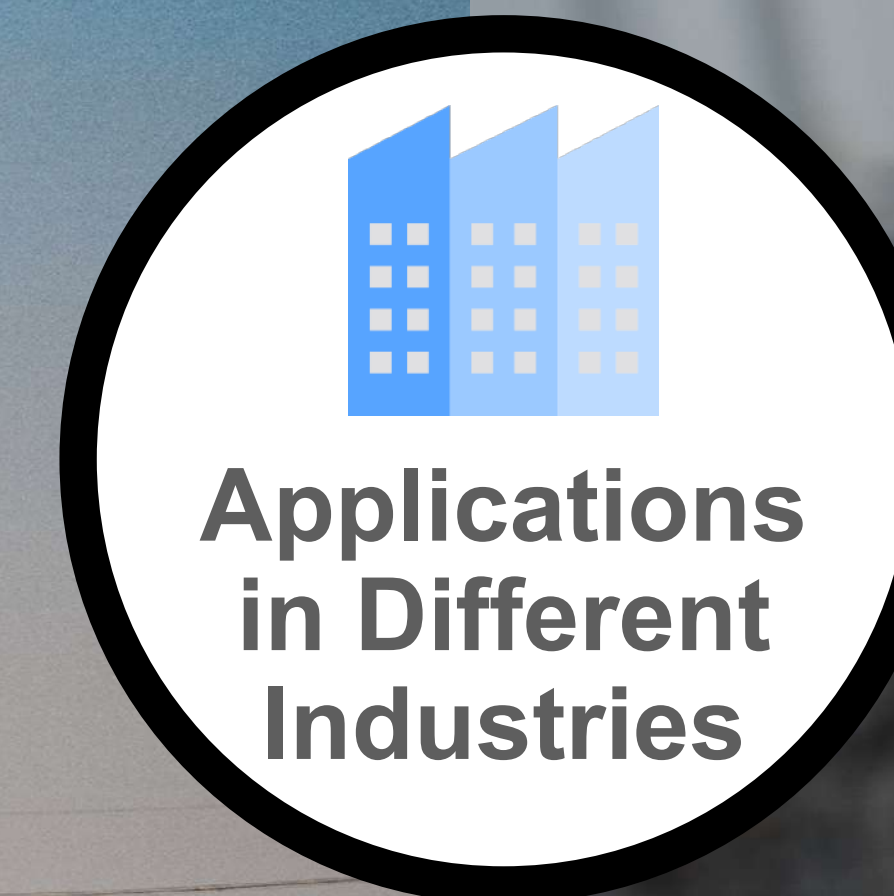
>> Designed to be recyclable,  
Made with less materials (additive manufacturing),  
Automation (Robotics), Biomanufacturing







Oil & Gas, Ag, Construction, Auto,  
Electronics, Semiconductors



>>

Hydrogen, EV (batteries),  
Wide Bandgap Semiconductor, Health,  
Alternative Food







Disposal or discharged



>>

Waste Valorization  
(CO<sub>2</sub> to material, waste to energy)





Low recycling rate



>>

Reused, Regenerated, Recycled & Up-cycled





