



# **ZERO EMISSION CONCEPT DESIGN FOR HINDUSTAN INSTITUTE OF TECHNOLOGY AND SCIENCE**



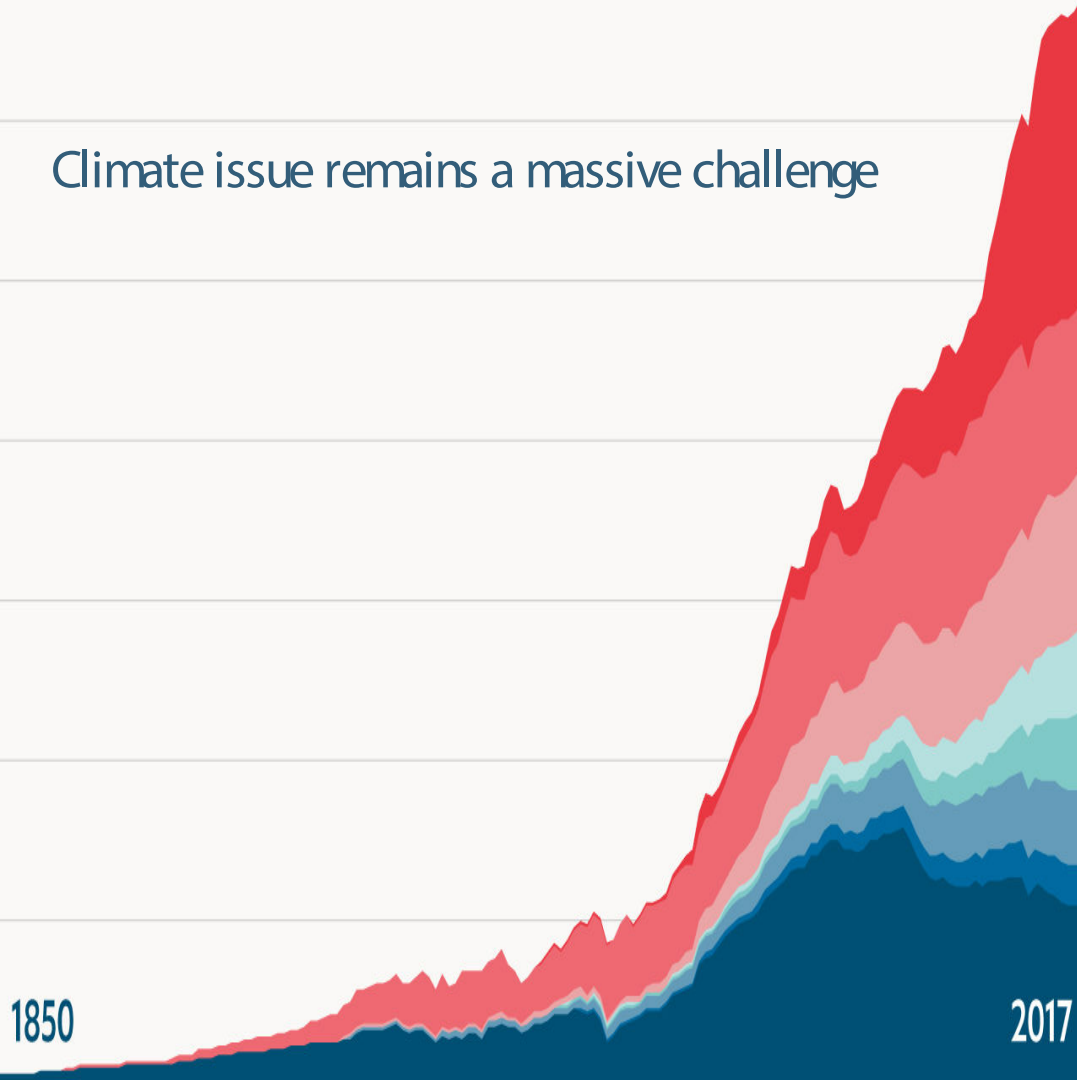
**HINDUSTAN**  
INSTITUTE OF TECHNOLOGY & SCIENCE  
(DEEMED TO BE UNIVERSITY)

**Dr. K. P. ISAAC**  
**VICE CHANCELLOR**

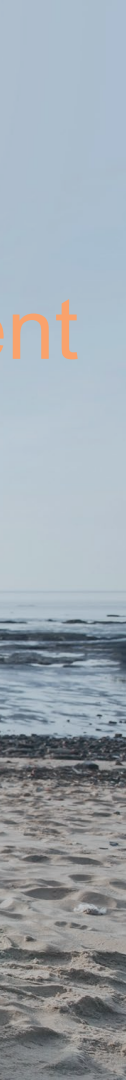
Trier University  
of Applied Sciences

**H O C H  
S C H U L E  
T R I E R**

Climate issue remains a massive challenge

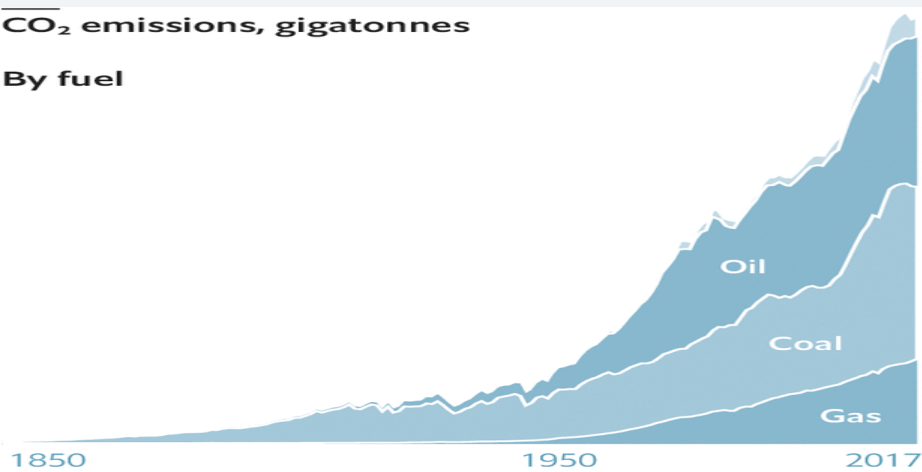


The past, present  
and future of  
climate change

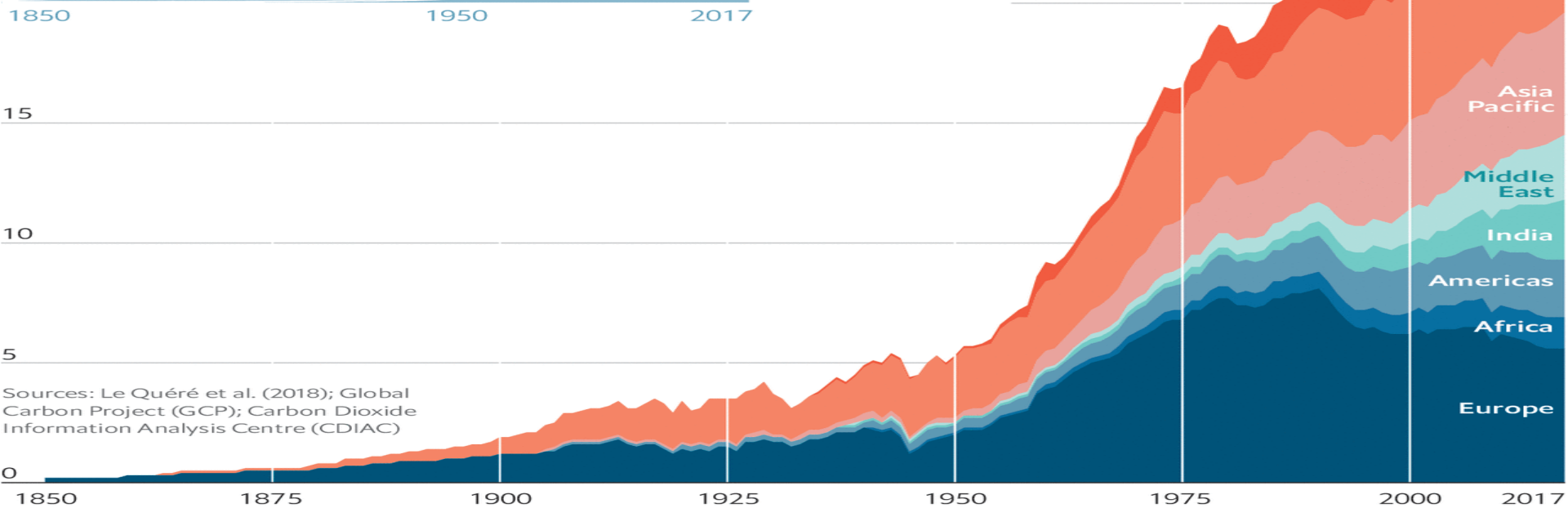


# CO<sub>2</sub> emissions, gigatonnes

## By fuel



## By country/region

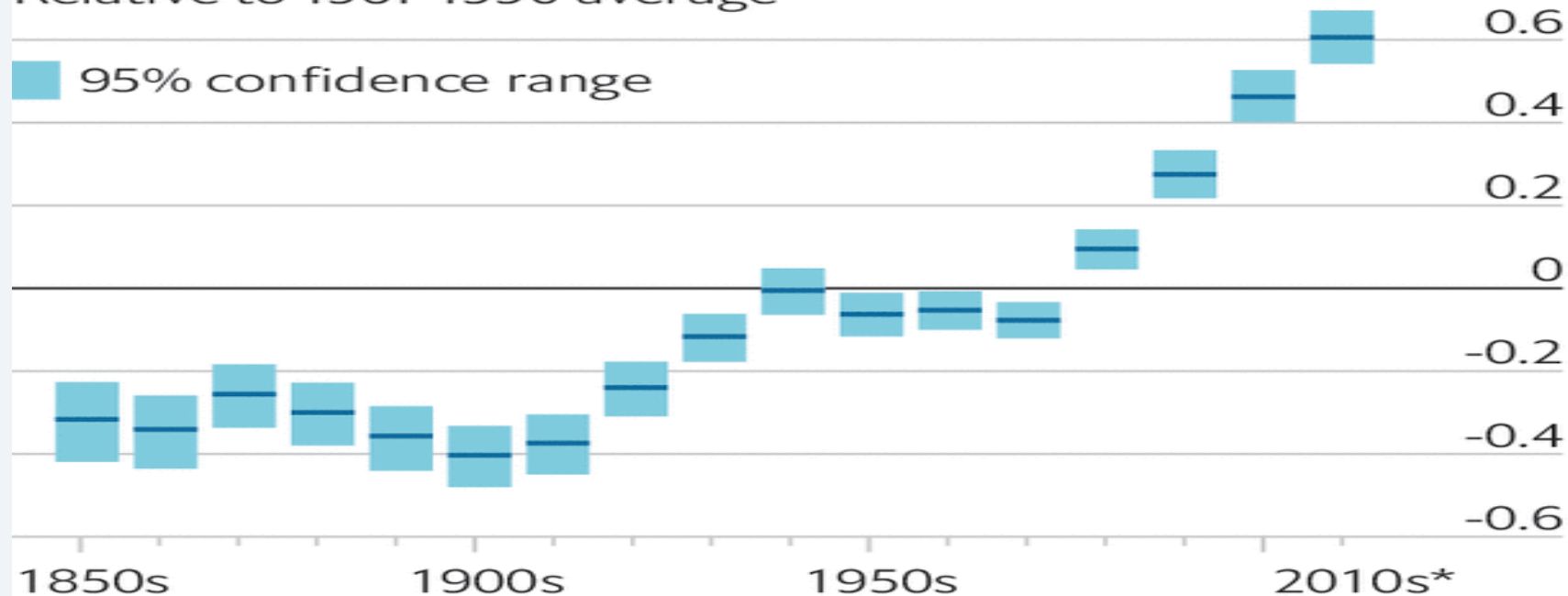


Sources: Le Quéré et al. (2018); Global Carbon Project (GCP); Carbon Dioxide Information Analysis Centre (CDIAC)

# Natural variations cannot produce decadal warming in this scale

## Global temperature change by decade, °C

Relative to 1961-1990 average



Sources: HadCRUT4; Morice et al. (2012)

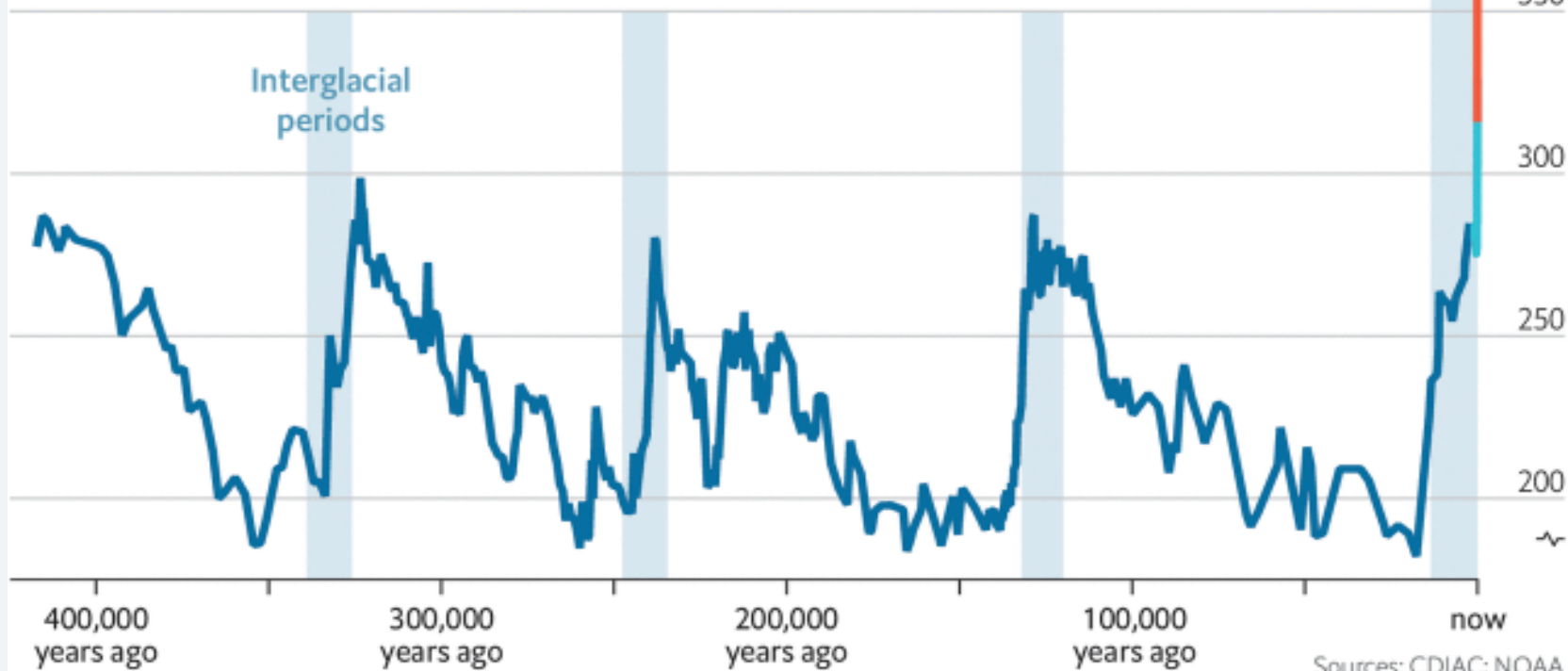
\*To July 2019



Like an ice age, in reverse; CO<sub>2</sub> levels are far higher than previous interglacial periods, and have risen remarkably fast

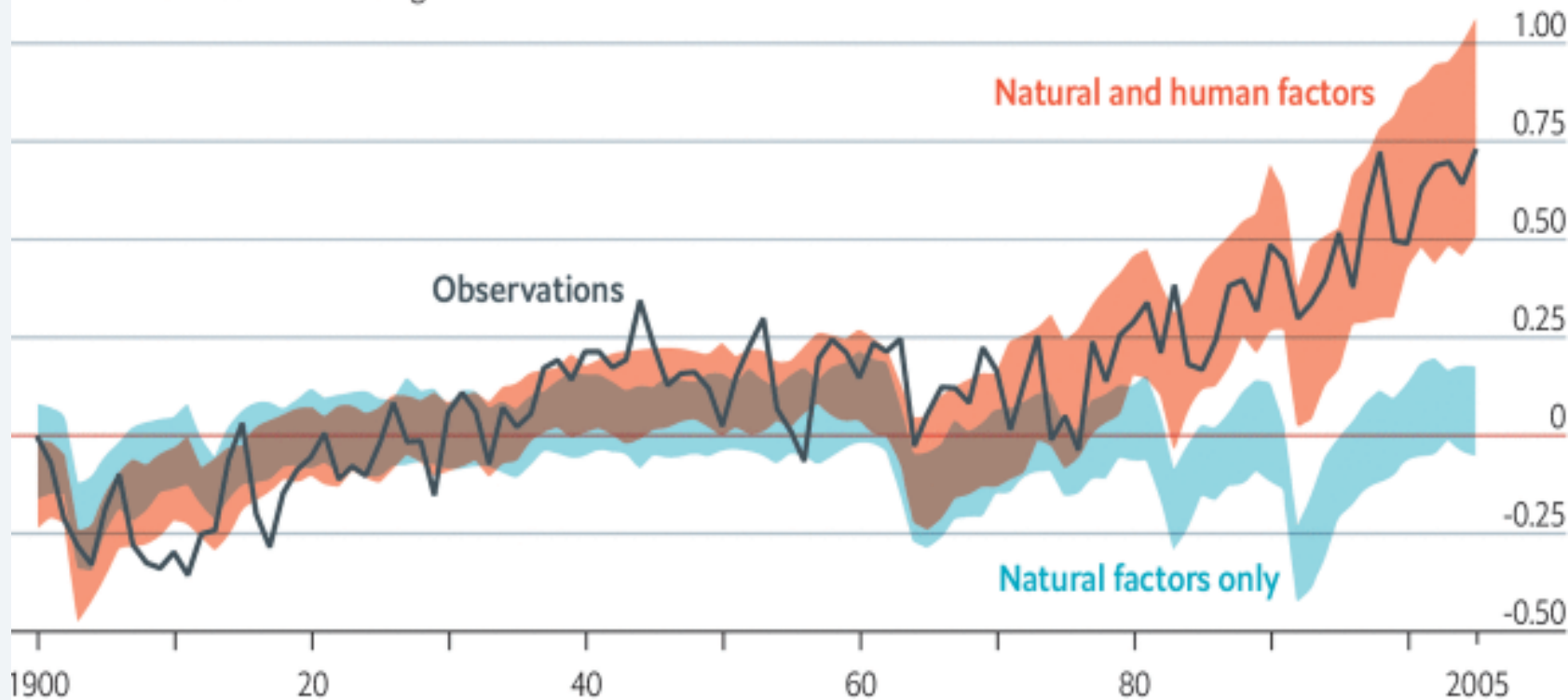
Atmospheric CO<sub>2</sub> levels, parts per million

Source — Vostok ice core — Law Dome ice core — Mauna Loa Observatory



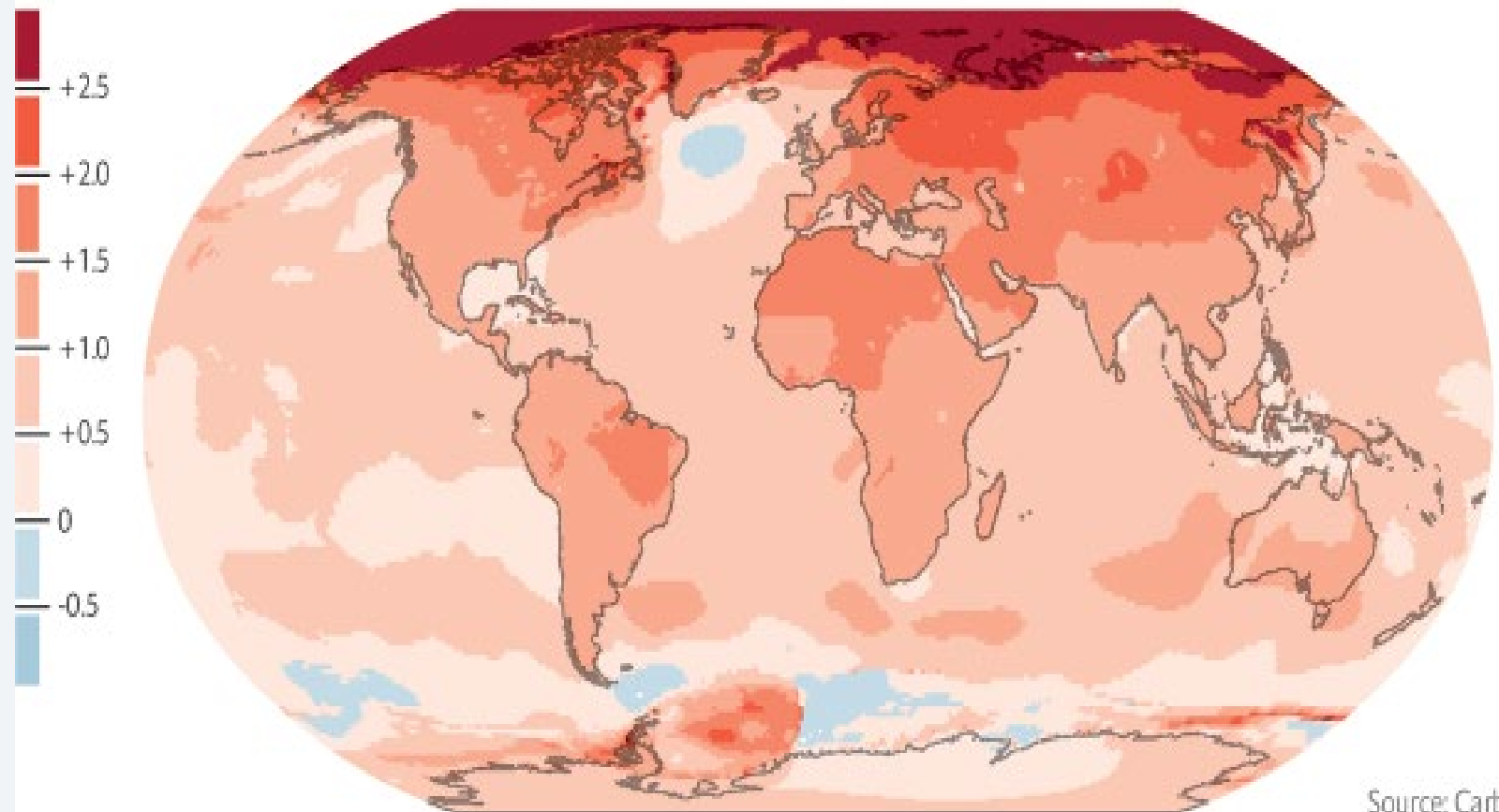
Only climate models which include human activity can explain the warming seen—which already exceeds 1.5°C in some places

Global temperature change, °C  
Deviation from 1850-1900 average



Source: US Global Change Research Programme

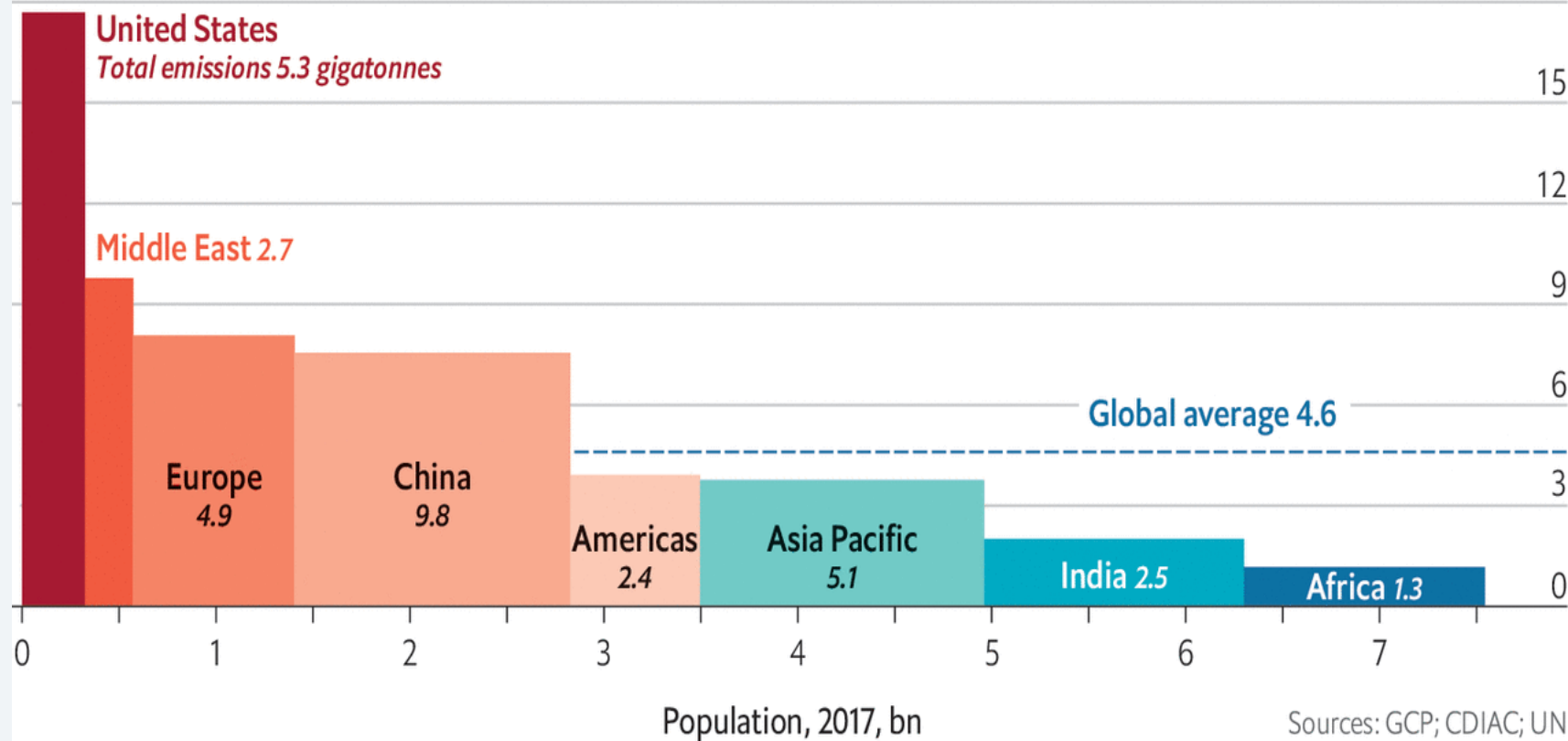
Global temperature change, °C, 2018, deviation from 1951-80 average



Source: Carbon Brief

# The world's CO<sub>2</sub> emissions are very unevenly spread

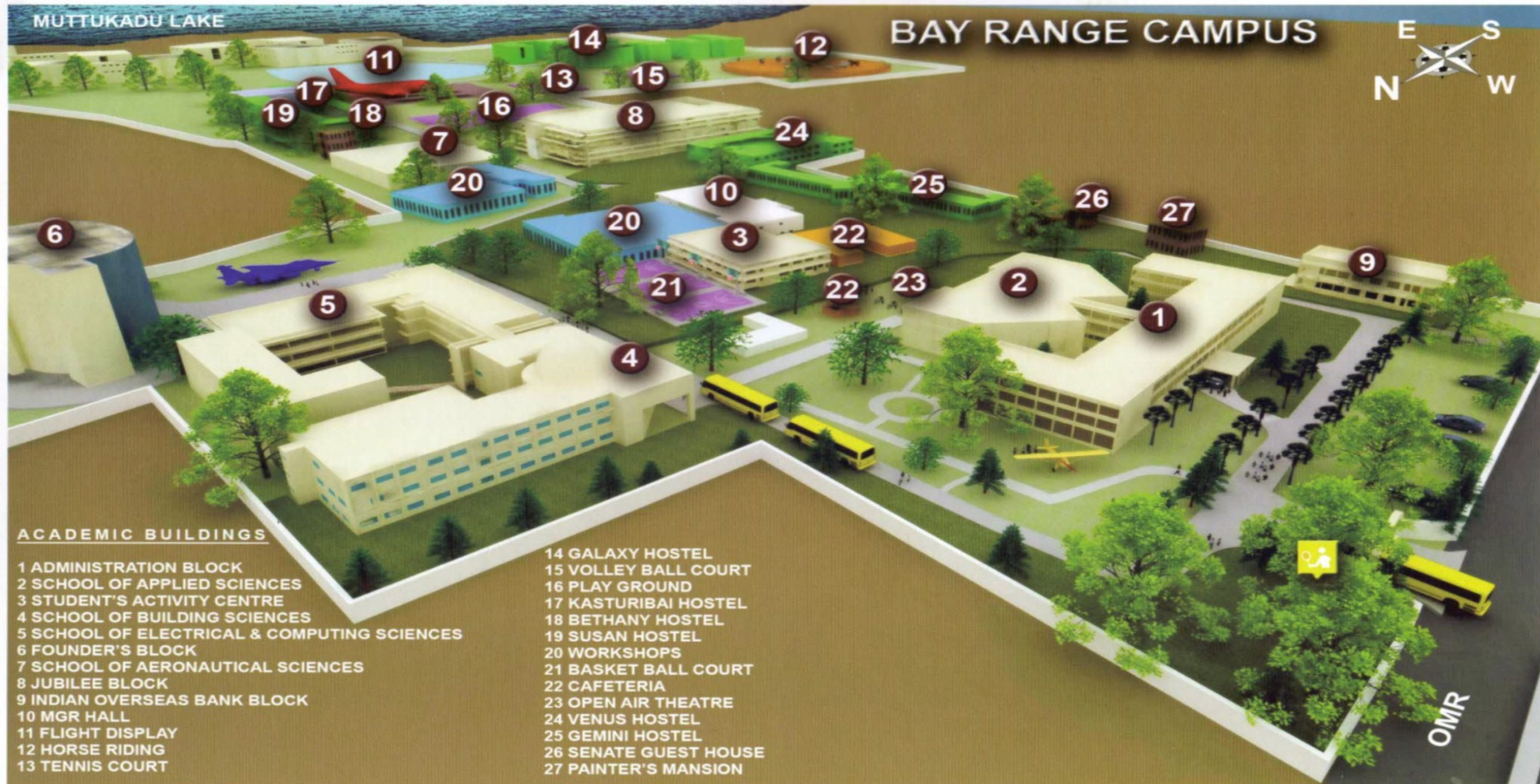
CO<sub>2</sub> emissions per person, 2017, tonnes





MUTTUKADU LAKE

## BAY RANGE CAMPUS



### ACADEMIC BUILDINGS

- 1 ADMINISTRATION BLOCK
- 2 SCHOOL OF APPLIED SCIENCES
- 3 STUDENT'S ACTIVITY CENTRE
- 4 SCHOOL OF BUILDING SCIENCES
- 5 SCHOOL OF ELECTRICAL & COMPUTING SCIENCES
- 6 FOUNDER'S BLOCK
- 7 SCHOOL OF AERONAUTICAL SCIENCES
- 8 JUBILEE BLOCK
- 9 INDIAN OVERSEAS BANK BLOCK
- 10 MGR HALL
- 11 FLIGHT DISPLAY
- 12 HORSE RIDING
- 13 TENNIS COURT

- 14 GALAXY HOSTEL
- 15 VOLLEY BALL COURT
- 16 PLAY GROUND
- 17 KASTURIBAI HOSTEL
- 18 BETHANY HOSTEL
- 19 SUSAN HOSTEL
- 20 WORKSHOPS
- 21 BASKET BALL COURT
- 22 CAFETERIA
- 23 OPEN AIR THEATRE
- 24 VENUS HOSTEL
- 25 GEMINI HOSTEL
- 26 SENATE GUEST HOUSE
- 27 PAINTER'S MANSION



**150acres**

**109,676sq. m**

**31**



# INFRASTRUCTURE

TOTAL CAMPUS AREA

TOTAL BUILT UP AREA

BUILDINGS

# INITIATIVES TO ARREST CLIMATE CHANGE

## HITS

01

WATER TREATMENT

02

GREEN BELT  
DEVELOPMENT

03

RAIN WATER  
HARVESTING

04

WASTE WATER  
TREATMENT

05

SOLAR ENERGY

06

SOLID WASTE  
MANAGEMENT

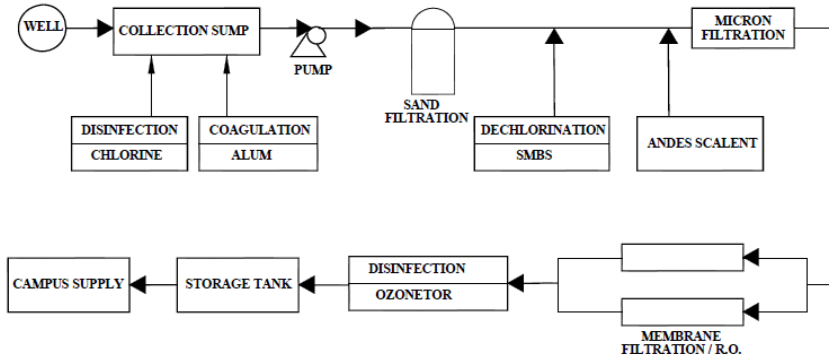
07

INITIATIVES FOR CO2  
REDUCTION



# WATER TREATMENT PLANT IN HITS

## REVERSE OSMOSIS WATER TREATMENT PLANT CAPACITY 4500 Ltrs/Hr.



**REVERSE -  
OSMOSIS (RO) Plant  
4500 litres/hr**







# GREEN BELT DEVELOPMENT

- ❑ Lush Green Campus Over 150 Acres
- ❑ 400 + Trees
- ❑ Temperature less by 3-4 degree celsius



# GREEN BELT DEVELOPMENT





# RECENT INITIATIVES



**ONE STUDENT ONE TREE  
PROJECT OF  
GOVERNMENT OF INDIA**



**Dr. M. P. Poonia,  
Vice chairman, AICTE,  
inaugurating the scheme on  
7th September 2019**



**Tree Plantation on the eve  
of 150<sup>th</sup> birth anniversary  
of Mahatma Gandhi on 1<sup>st</sup>  
October 2019**

# RAIN WATER RECHARGING FACILITIES



**Rain water to recharge pond/lake  
inside the campus**



**Rain water to recharge in wells (6 Nos)**

# WATER CONSERVATION MEASURES WASTE WATER MANAGEMENT



Activated Carbon Filter

PRESSURE SAND FILTER



Aeration Tank



# THE TREATED WASTEWATER IS USED FOR THE GARDEN ACTIVITIES





*Renewable Energy  
initiative*

**SOLAR PANELS OF  
CAPACITY 100 KW**





# Waste leaves to Manure



**The manure is used for organic farming within our campus and also shared with some of the local farmers in Padur village**



# LITTER AND PLASTIC FREE CAMPUS



- ☐ Quantity of the waste generated in the campus is considerably reduced by adopting the policy of 'Reduce Reuse and Recycle'.
- ☐ Plastics and metals are segregated and taken by vendors for recycling.
- ☐ Use of Plastic bags and disposable Cups and Plates is discouraged in the campus and only Paper bags are allowed to use.
- ☐ A campaign for plastic free India – demonstrated by the students of HITS – 2<sup>nd</sup> Oct 2019.

## INSTALLATIONS OF SANITARY PADS DISPOSAL MACHINE



Sanitary pads disposal machine is installed in the ladies hostel

# Ongoing Research in HITS

- ❖ **Centre For Sustainable Technologies(CST)**
- ❖ **Centre for Sensors and Process Control (CENSE)**
- ❖ **Centre for Clean Energy and Nano Convergence(CENCON)**

# **Centre For Sustainable Technologies(CST)**

**Renewable Energy Production/ CO<sub>2</sub> reduction towards zero emissions**



## **RECOVERY OF HYDROGEN FROM WASTEWATER –**

**Research project funded by DST, Govt. of India**

### **CO<sub>2</sub> SEQUESTRATION -**

- **A project proposal submitted to DST on curing of concrete using flue gas from cement industries for CO<sub>2</sub> sequestration.**

**Bio-oil production from algae and utilization in internal combustion engines**

**Bio-gas production from food waste (from hostels, HITS) and utilization.**



## Centre For Sustainable Technologies(CST)



**Renewable Energy Production/ CO<sub>2</sub> reduction towards zero emissions**

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**CO<sub>2</sub>  
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**BIO-OIL  
PRODUCTION**

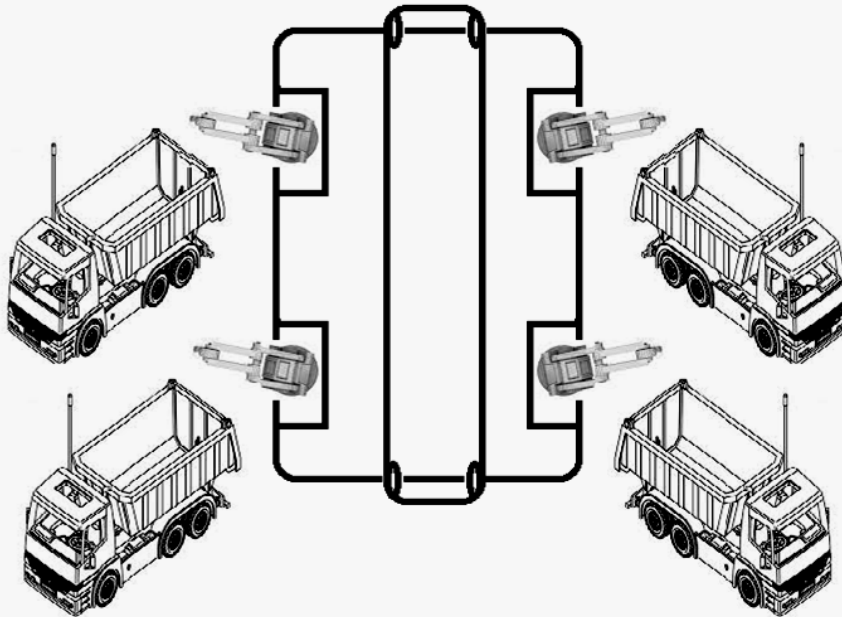
- From algae and utilization in internal combustion engines

**BIO-GAS  
PRODUCTION**

- From food waste (from hostels, HITS) and utilization

## Centre for Sensors and Process Control (CENSE)

### Proposed Robotic Controlled Movable Waste Management System for Solid Waste Segregation



It uses locomotives, conveyor belts and smart sensors associated with high resolution image processing technology.

# Centre for Clean Energy and Nano Convergence(CENCON)



**Inaugurated by**

**His Excellency,  
Dr. A. P. J. Abdul Kalam,  
Former President of India,  
On 6<sup>th</sup> January 2011**

CENCON was established in collaboration with Quantum functional Semiconductor Research centre (QSRC), Dongguk University, South Korea with an objective to promote basic and applied research. Centre has collaboration with Royal Institute of Technology (KTH) and Uppsala University, Sweden.

CENCON aims at


- Addressing current advances and challenges in energy sector, especially the renewable and clean energy scenario.
- Improving the quality of life through development of new smart products by using green route technology

**Centre working in the thrust areas of: Next generation rechargeable Batteries, Hybrid solar cells, Photovoltaics, Photocatalytic reduction of CO<sub>2</sub>, Dye degradation, Toxic gas sensing, H<sub>2</sub> production using PEC, H<sub>2</sub> storage using Graphene like 2D materials. Water purification, photoluminescence.**

# Proposed Research (for discussion)

- ❖ To develop HITS as a 100% sustainable campus with net zero emission
- ❖ Improving the methodology for waste treatment
- ❖ Technology for storing energy (battery) and hydrogen fuel cells
- ❖ Conservation of Energy
- ❖ Design of infrastructure for green rating
- ❖ Develop HITS campus as a demonstration model



An abstract graphic featuring two dice with a camouflage pattern, one slightly behind the other. A red snake with black scales is coiled around them. The background is a vibrant red with a halftone dot pattern. A thin orange line extends from the text to the right die.

Predicting the  
climatic future is  
riddled with  
uncertainty



THANK  

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YOU