

# AMBASSADORS OF SUSTAINABILITY

## CLIMATE CHANGE AND PEACE

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WHERE I COME FROM

# MALAYSIA





## WHERE I COME FROM

### MTUN UNIVERSITIES:

- UNIVERSITI TEKNIKAL MALAYSIA MELAKA (UTEM)
- UNIVERSITI MALAYSIA PERLIS (UNIMAP)
- **UNIVERSITI TUN HUSSEIN ONN MALAYSIA (UTHM)**
- UNIVERSITI MALAYSIA PAHANG (UMP)

# WHERE I COME FROM



Faculty of Civil  
Engineering and Built  
Environment

# Topics On Climate Change And Peace

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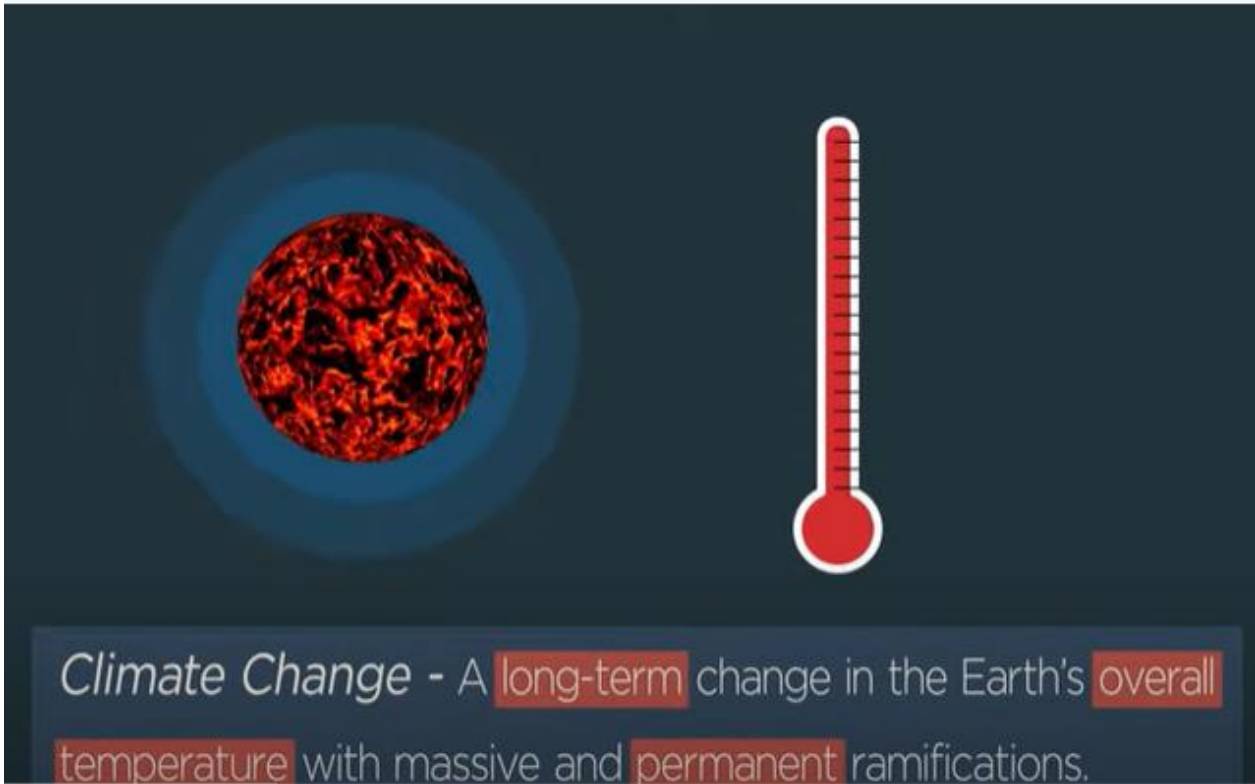
**MYRESEARCH**

**01**



**INTRODUCTION**

# What is climate change?



## CLIMATE CHANGE

**Climate change** is a long-term shift in global or regional climate patterns, in particular refers specifically to the **rise in global temperatures** from the mid-20th century to present and attributed largely to the **increased levels of atmospheric carbon dioxide** produced by the use of fossil fuels

# Causes of climate change?



**Rapid industrialization**



**Consumer practices**



**Energy use**



**Livestock**



**Agricultural practices**



**Transport**



**Deforestation**



**Pollution**



# Climate indicators

**Carbon Dioxide (CO<sub>2</sub>) levels**

**Ice Sheets**

**Global Temperature**

**Sea Level**

**Arctic Sea Ice Minimum**

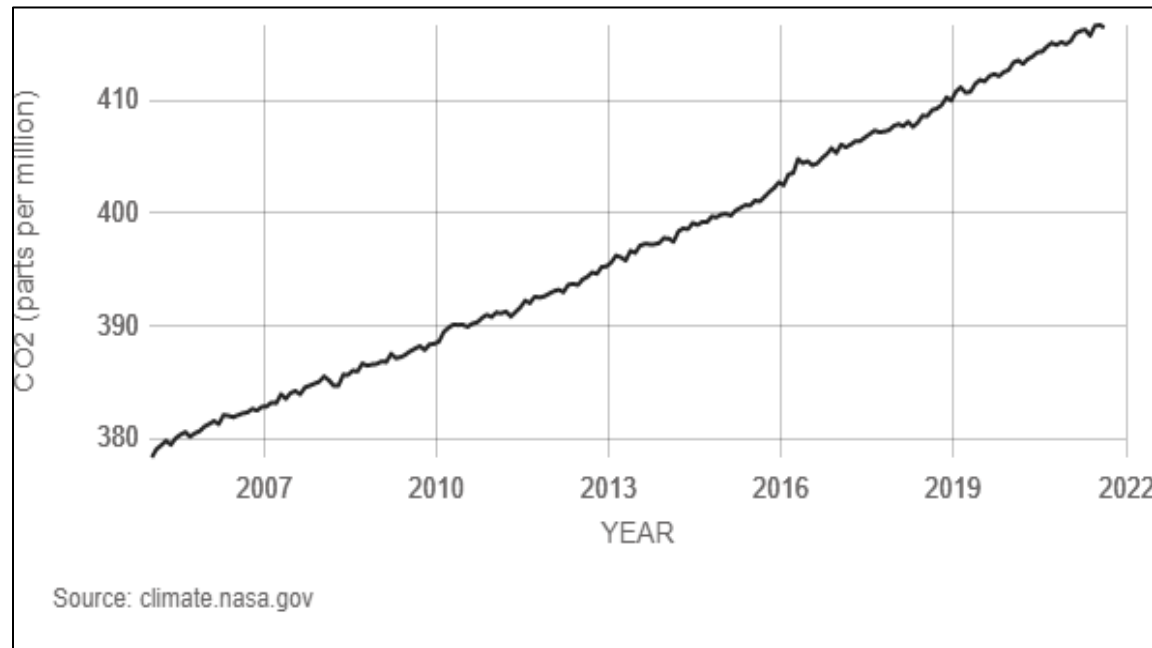
**Ocean Heat Content**

# -Carbon Dioxide (CO<sub>2</sub>) levels-

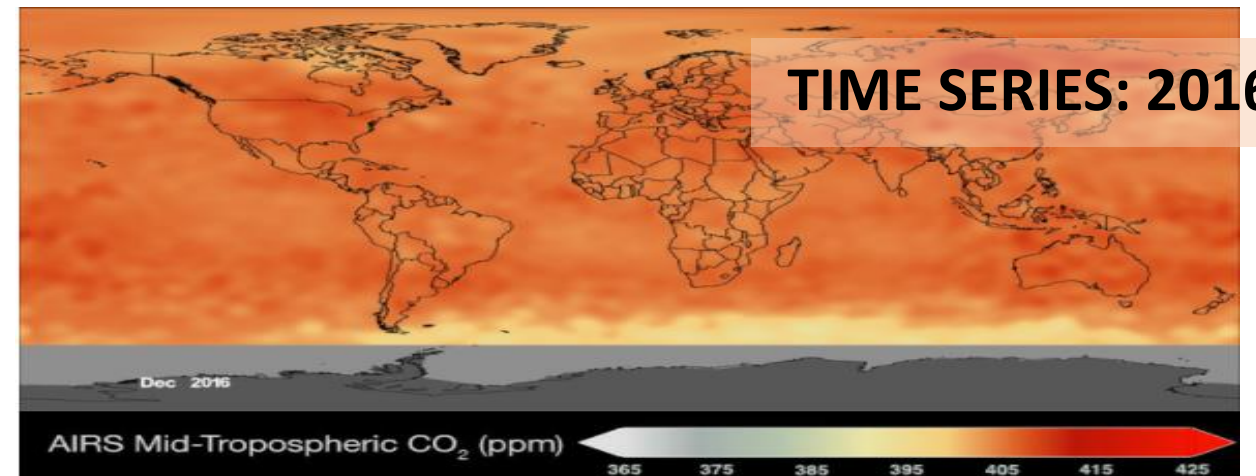
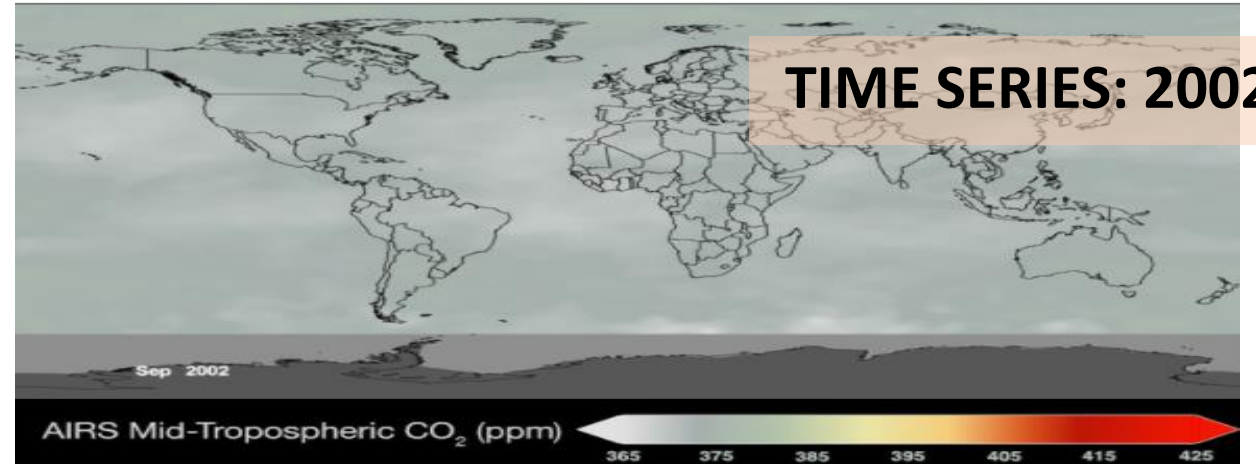
Latest measurement: August 2021

**416 ppm**

- Human activities have profoundly increased CO<sub>2</sub> (a heat-trapping gas) levels in Earth's atmosphere.



DIRECT MEASUREMENTS: 2005-PRESENT



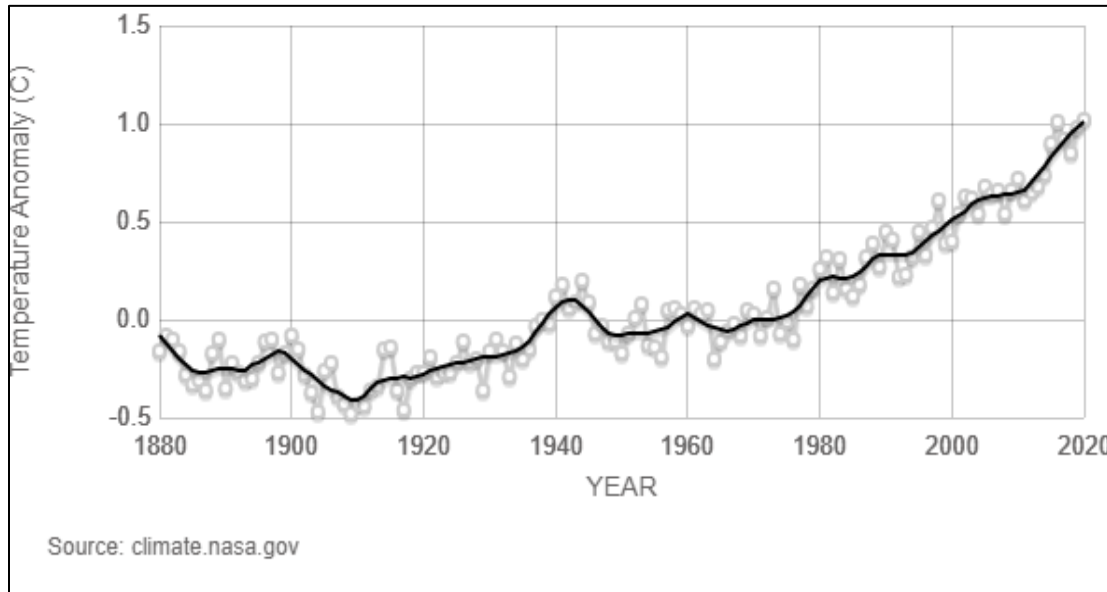
Global distribution and variation of the concentration of mid-tropospheric carbon dioxide in parts per million (ppm)

# -Global Temperature-

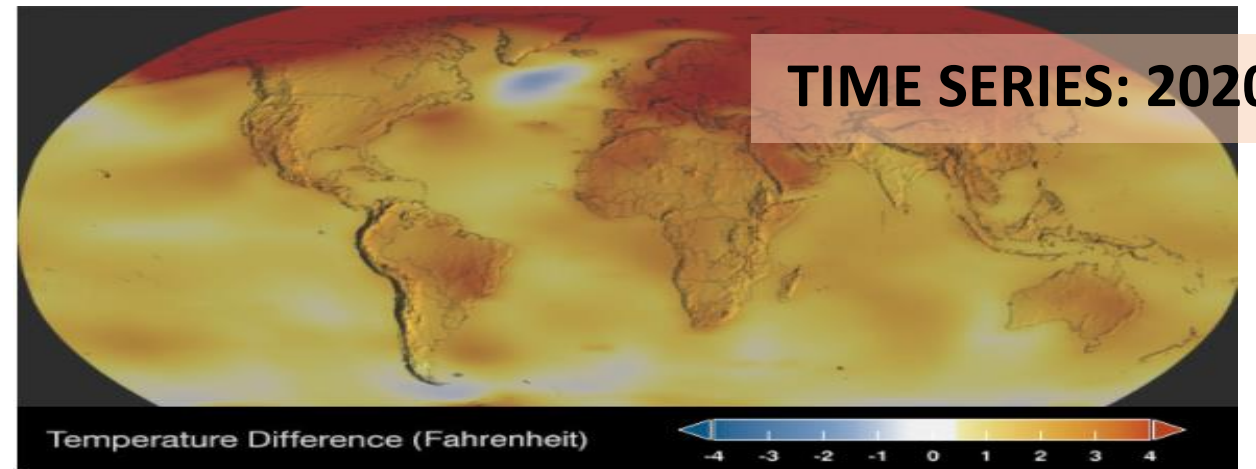
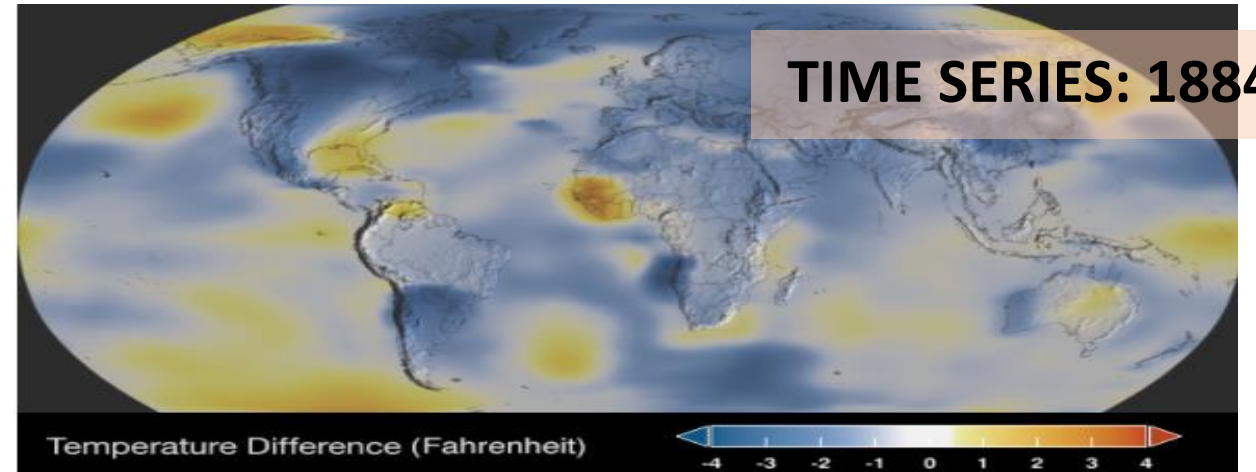
LATEST ANNUAL AVERAGE ANOMALY: 2020

**1.02°C | 1.84°F**

- Earth's surface continues to significantly warm, with recent global temperatures being the hottest in the past 2,000-plus years.



GLOBAL LAND-OCEAN TEMPERATURE INDEX



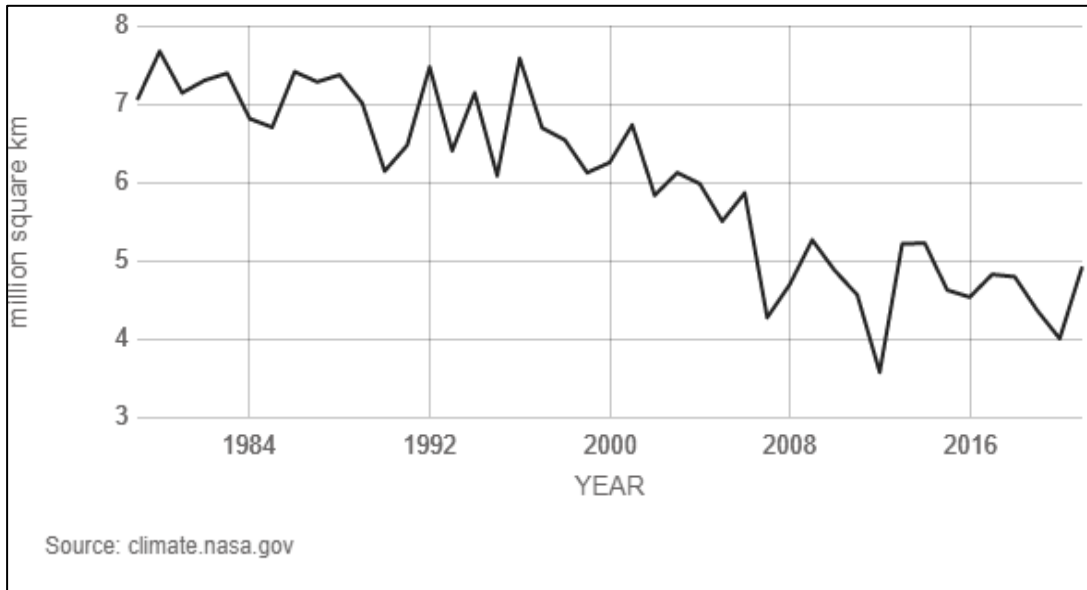
Change in global surface temperature

# -Arctic Sea Ice Minimum-

## RATE OF CHANGE

↓13.0% per decade

- Arctic sea ice extent has declined significantly in all months since 1979, with Septembers showing the largest declines.



AVERAGE SEPTEMBER MINIMUM EXTENT



TIME SERIES: 1979



TIME SERIES: 2020

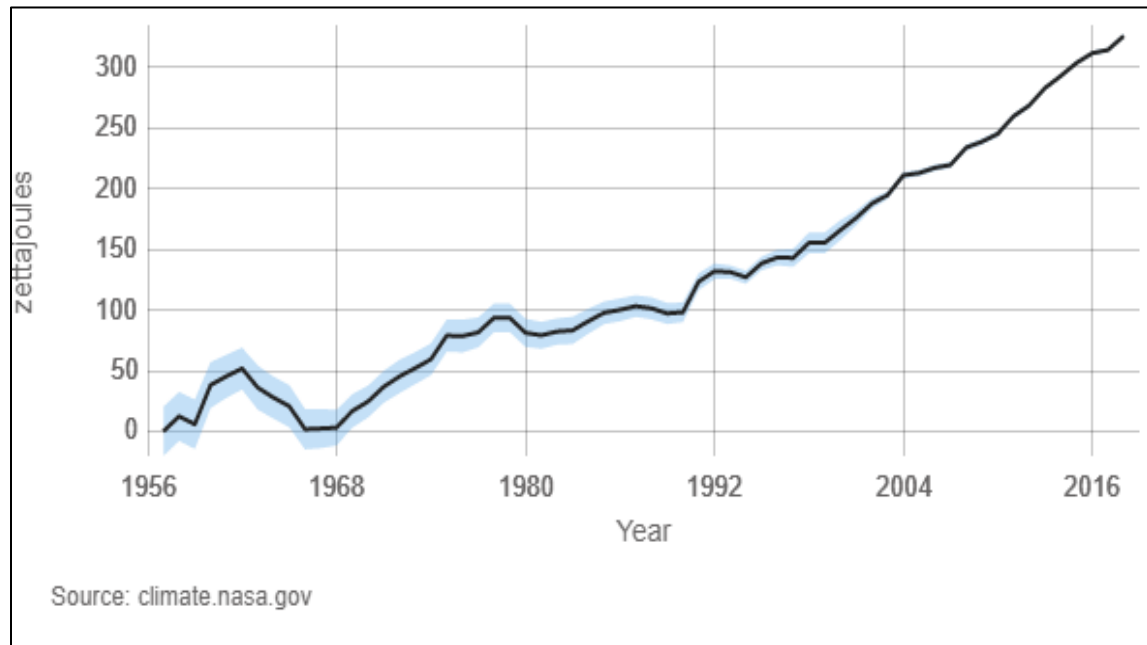
Annual Arctic sea ice minimum since 1979, based on satellite observations

# -Ocean Heat Content-

**LATEST MEASUREMENT: December 2020**

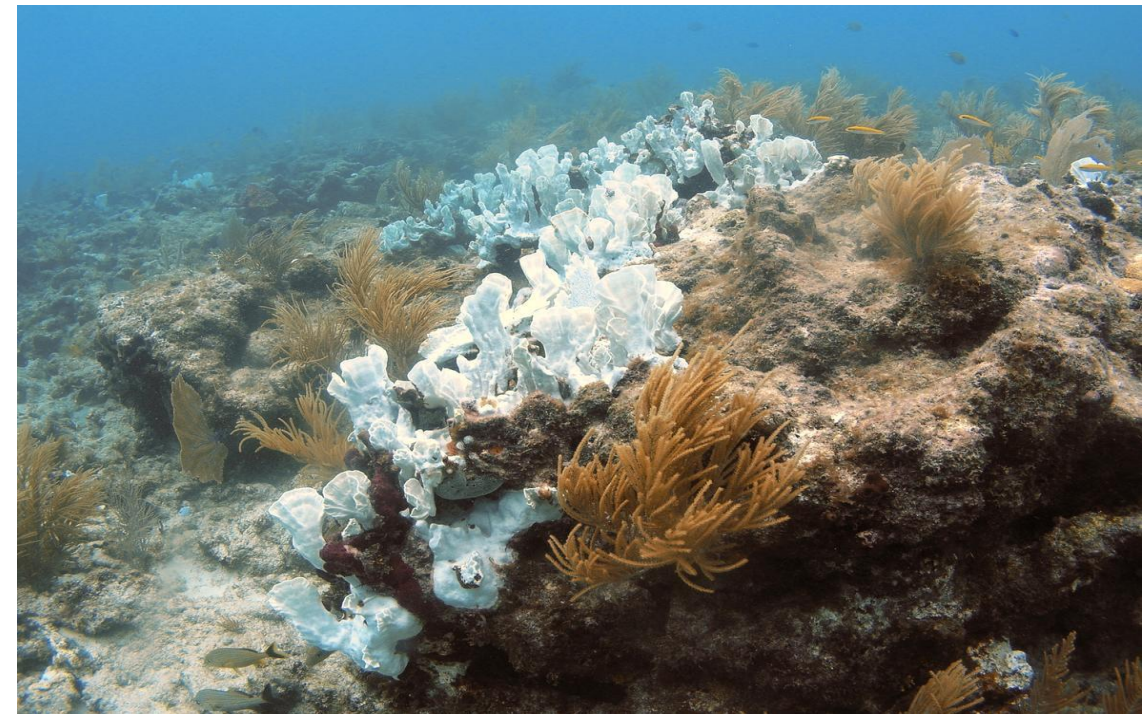
**326 ( $\pm 2$ ) zettajoules**

90% of global warming is occurring in the ocean, with the last decade and the year 2020 being the hottest.



OCEAN HEAT CONTENT CHANGES SINCE 1955 (NOAA)

The effects of ocean warming include sea level rise due to thermal expansion, coral bleaching, accelerated melting of Earth's major ice sheets, intensified hurricanes, and changes in ocean health and biochemistry.



Bleached coral off Islamorada, Florida

# Composition of global greenhouses gas (GHG)

**Carbon dioxide (CO<sub>2</sub>):** Fossil fuel use is the primary source of CO<sub>2</sub>. CO<sub>2</sub> can also be emitted from direct human-induced impacts on forestry and other land use, such as through deforestation, land clearing for agriculture, and degradation of soils. Likewise, land can also remove CO<sub>2</sub> from the atmosphere through reforestation, improvement of soils, and other activities.

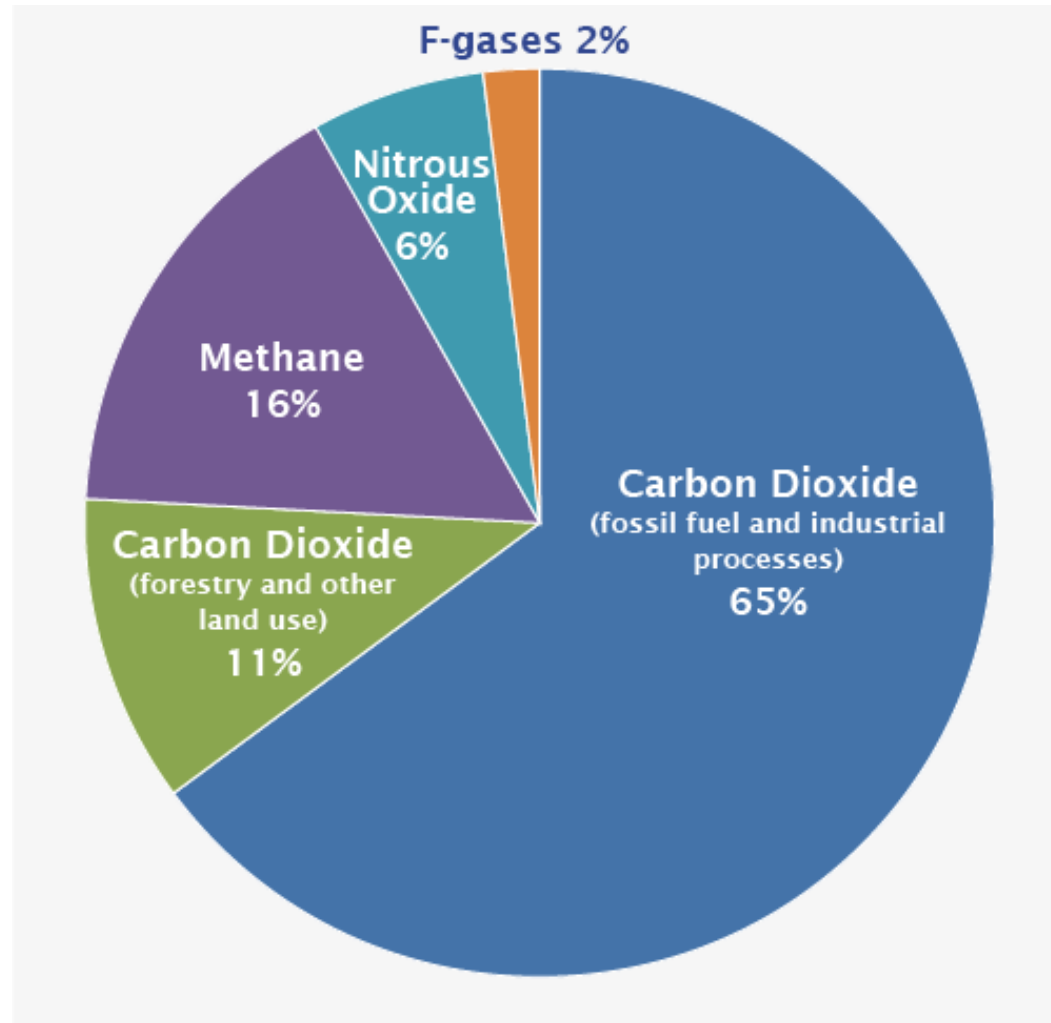
**Methane (CH<sub>4</sub>):** Agricultural activities, waste management, energy use, and biomass burning all contribute to CH<sub>4</sub> emissions.

**Nitrous oxide (N<sub>2</sub>O):** Agricultural activities, such as fertilizer use, are the primary source of N<sub>2</sub>O emissions. Fossil fuel combustion also generates N<sub>2</sub>O

**Fluorinated gases (F-gases):** Industrial processes, refrigeration, and the use of a variety of consumer products contribute to emissions of F-gases, which include hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF<sub>6</sub>).

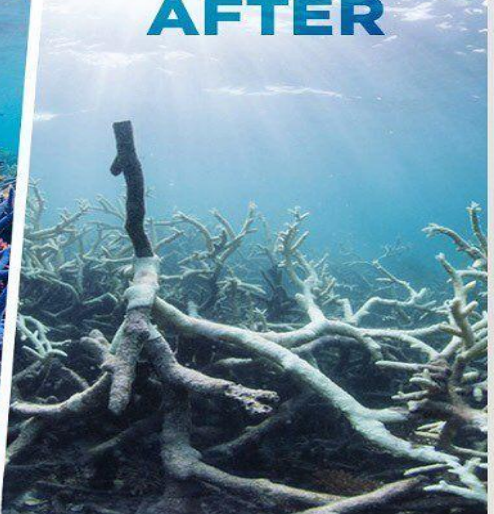
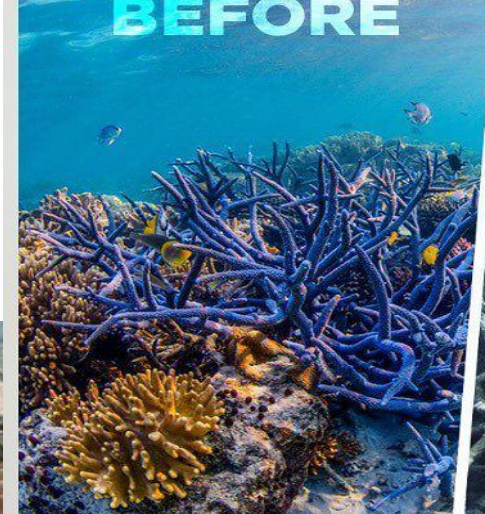
SOURCE: IPCC (2014), <https://www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data>

# Composition of global greenhouses gas (GHG)



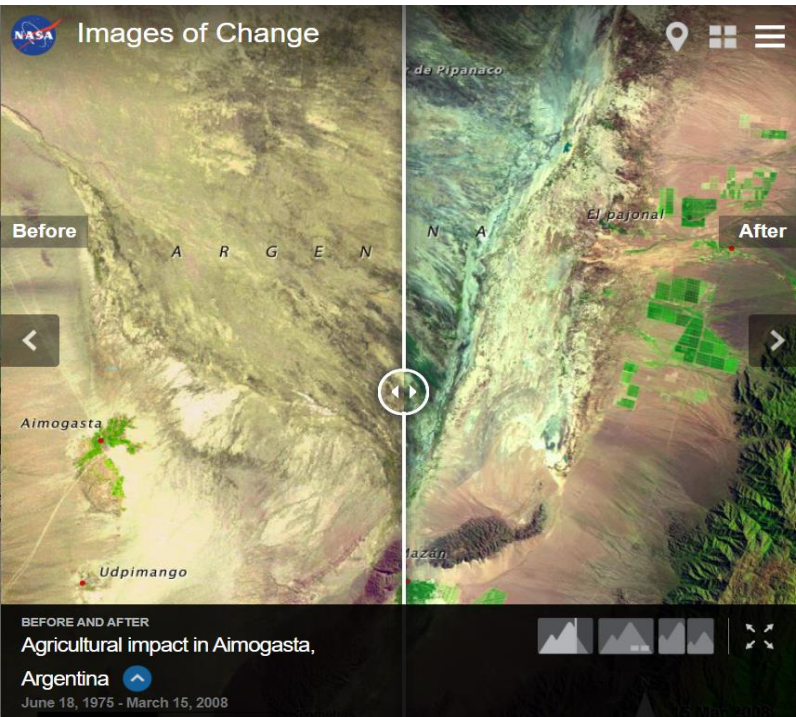
SOURCE: IPCC (2014), <https://www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data>

# Effects of climate change?

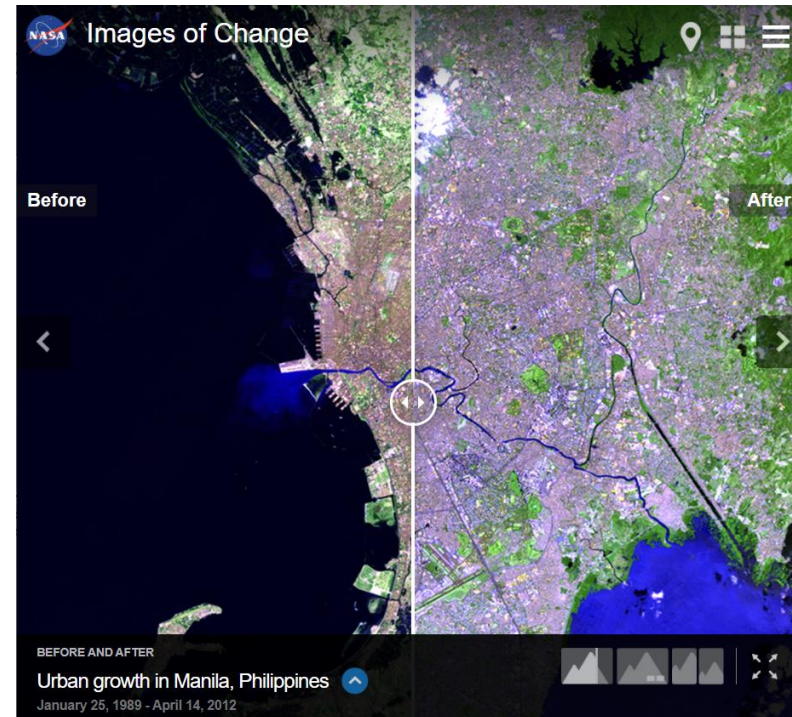




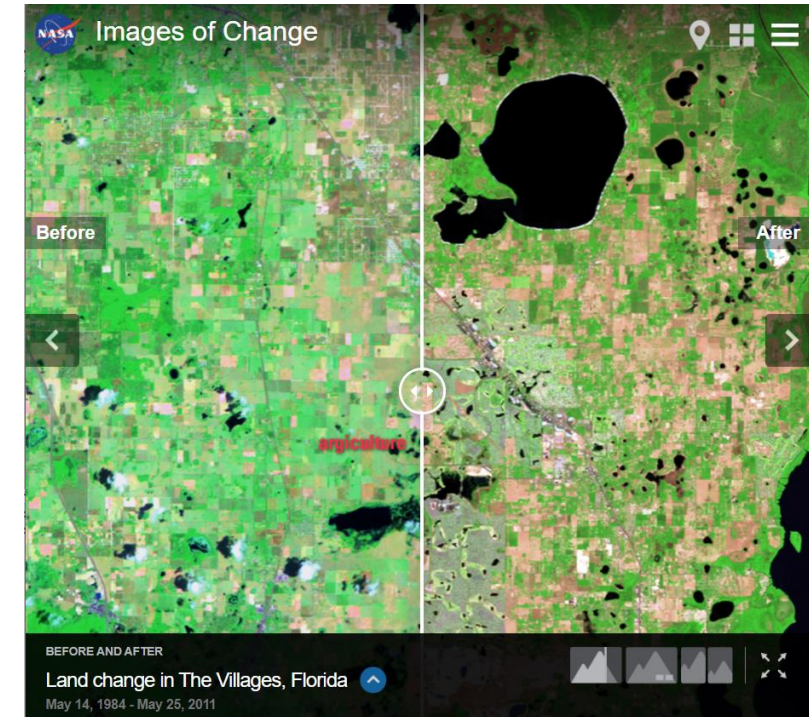
# Effects of climate change on cities



Aimogasta is a regional center of olive production, trade and tourism. **Expansion of the agricultural frontier in this region has led to increased wind and water erosion, salinization, and loss of biodiversity.** In the 2008 image, cultivated fields that did not exist in 1975 are visible around Aimogasta, Villa Mazán and El Pajonal (seen as green areas with regular geometric patterns).

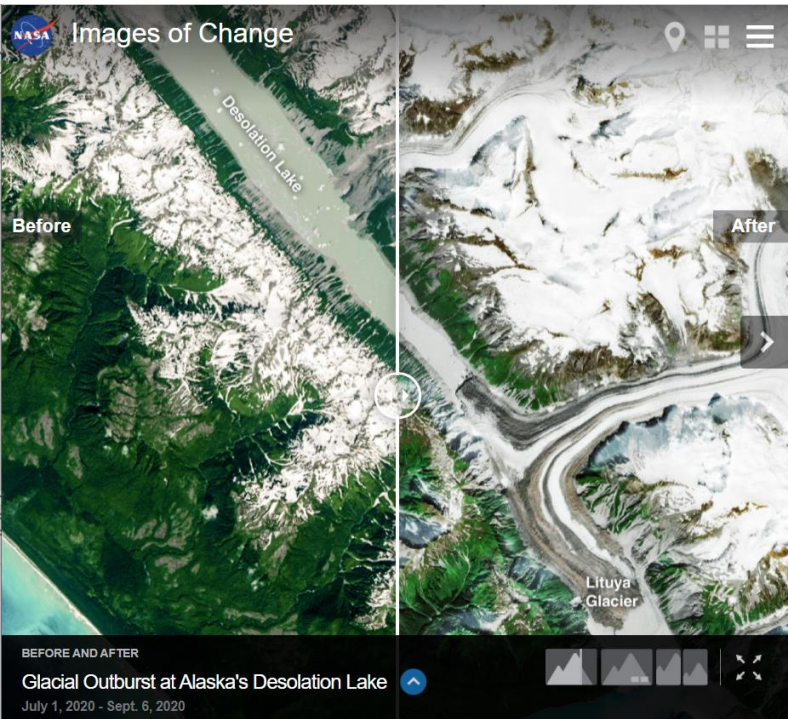


The Philippine capital of Manila is the most densely populated city in the world, with more than 1.6 million inhabitants in 14.8 square miles (38.5 square kilometers). The greater metro area covers 246 square miles (638 square kilometers) and hosts a population of over 11 million. These satellite images illustrate how much the **city has expanded** in little more than two decades, **bringing significant infrastructure and environmental problems.** The Pasig River, which cuts through the urban area, is one of the most polluted rivers in the world.

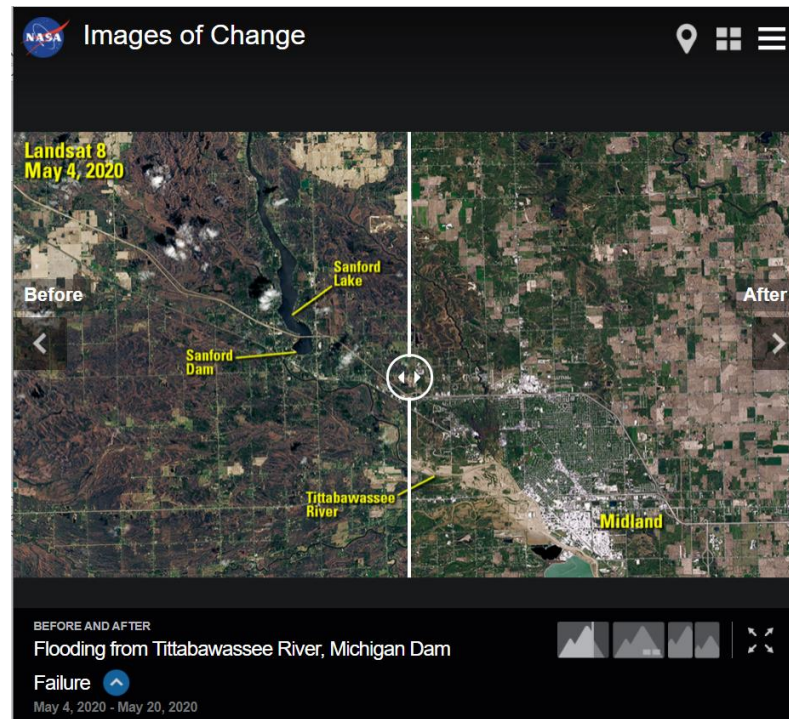


As the U.S. population has aged, more older people have been moving from northern states to southern communities. Sumpter County in central Florida grew 75 percent since 2000, largely **due to expansion of The Villages, a master-planned retirement community with a strong emphasis on golf.** Started as a mobile home park in the early 1980s, **The Villages was the fastest growing micro-population area in the United States by 2008.** These images illustrate the changes that have accompanied this growth.

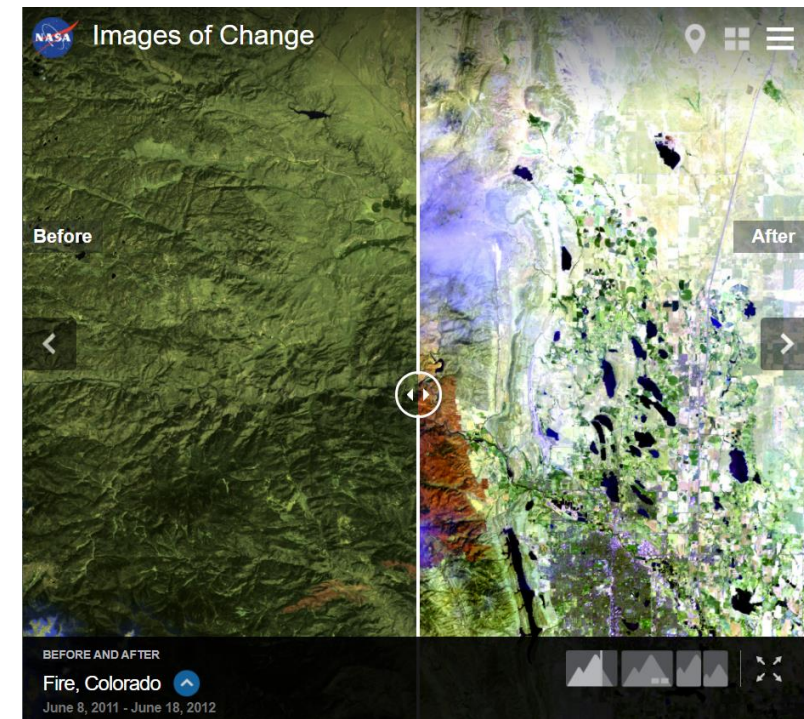
# Effects of climate change on extreme events



Alaska's Lituya Glacier acts as a dam that holds back a vast pool of glacial meltwater informally known as Desolation Lake. In August 2020, part of **the ice dam gave way** and an estimated 132 billion gallons (500 billion liters) of water **quickly drained out of the lake** in an event known as a **glacial lake outburst flood**. The water evidently flowed under Lituya Glacier, then over the gravel delta at the glacier's southern end and into Lituya Bay. The lake's water level reportedly dropped at least 200 feet (60 meters) in the event, which shows up in the September image as a narrowing of its width.

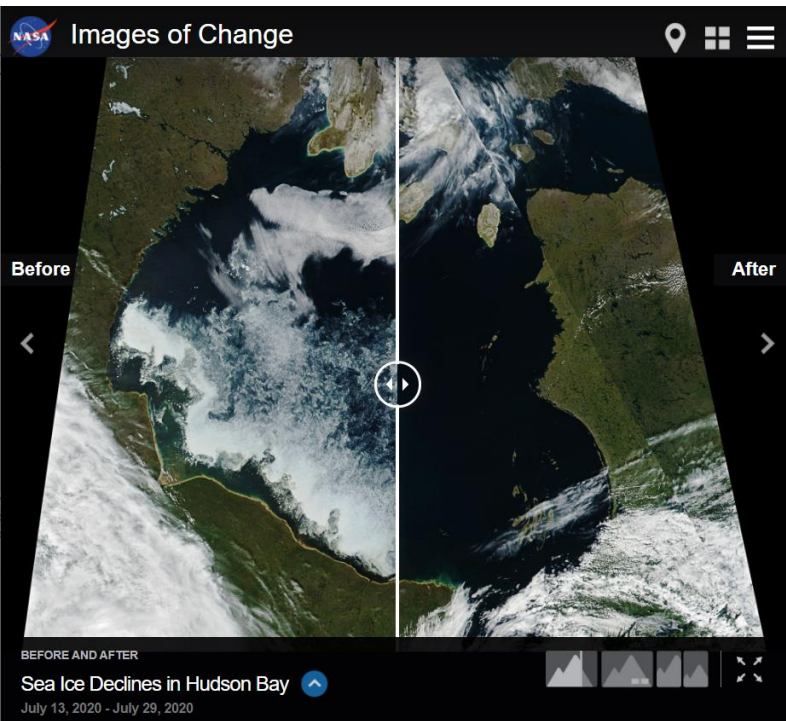


**Sanford Dam failed** on May 19, 2020, **flooding the area downstream**. The image on the right was taken the following day, when the Tittabawassee River peaked some 10 feet above flood stage at Midland, Michigan. Muddy floodwater is visible spilling onto land near the river. The image on the left shows the region before the flooding, when the dam still held back the waters of Sanford Lake.

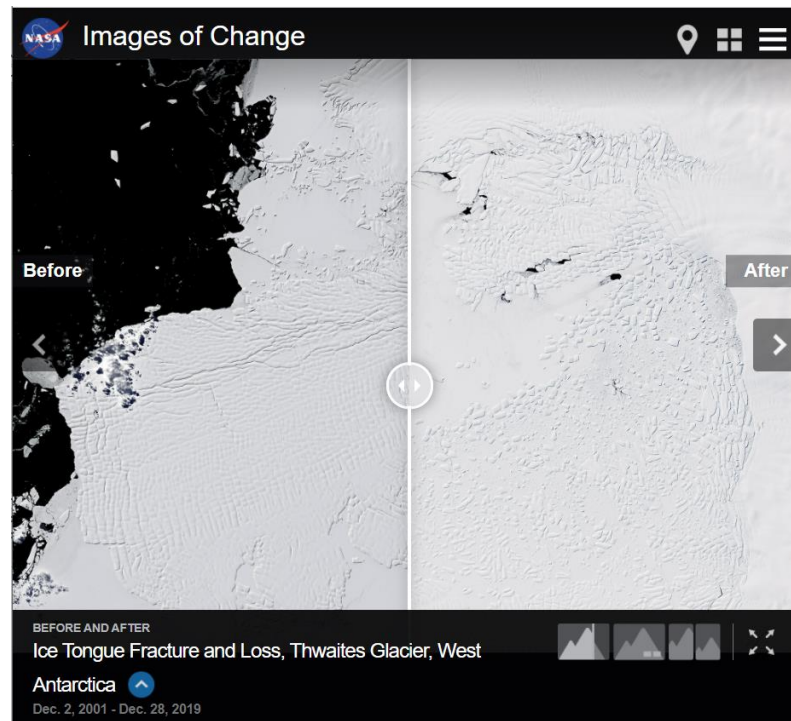


**Sparked by lightning** on June 9, 2012, the High Park Fire burned more than 87,000 acres near and in Roosevelt National Forest, just west of Fort Collins, Colorado. One person was killed and at least 259 homes were destroyed. **High temperatures and strong winds hampered efforts to extinguish the blaze**, which was the second largest in Colorado history.

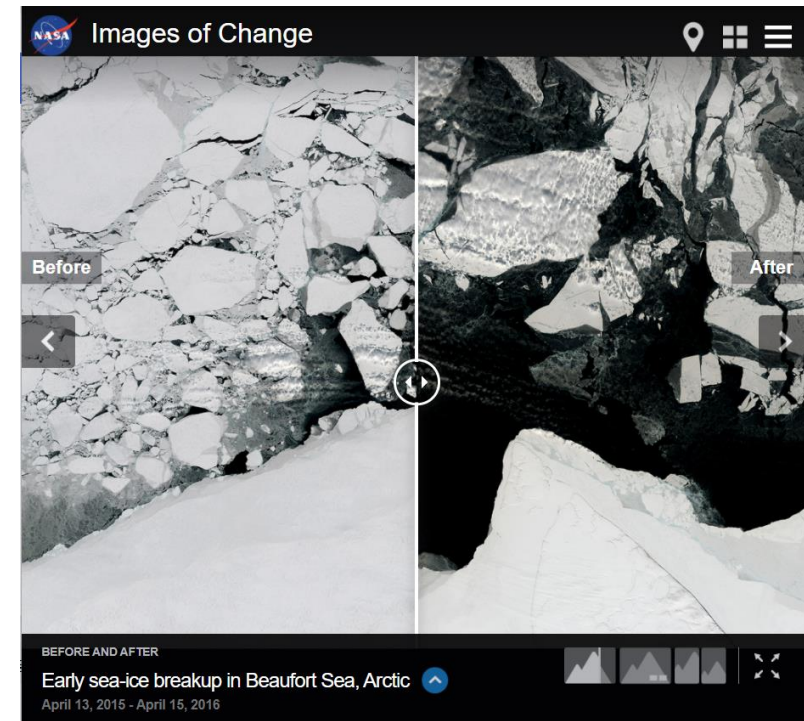
# Effects of climate change on ice



Hudson Bay, which is considered a sea of the Arctic Ocean despite being surrounded by land, freezes over completely in winter and thaws in summer. These images show the **decrease in ice** over the course of 16 days in July 2020. During the thaw, polar bears travel over the slowly melting sea ice to hunt for ringed seals and other prey. When the ice becomes too scarce, the bears fast and wait for it to return. **The area has lost about a third of the polar bear population** since the 1980s, dropping the count from about 1200 to 800, apparently because declining summer sea ice has given them less opportunity to feed.



A thick mass of floating ice, called an "ice tongue," stretches from Thwaites Glacier, which sits on solid ground in West Antarctica, into the Amundsen Sea. These images show the **fracturing and loss of much of the ice tongue** from 2001 to 2019. **Ice moving from land to sea contributes to sea-level rise**, and the amount of ice flowing into the sea from Thwaites has doubled in the span of three decades.

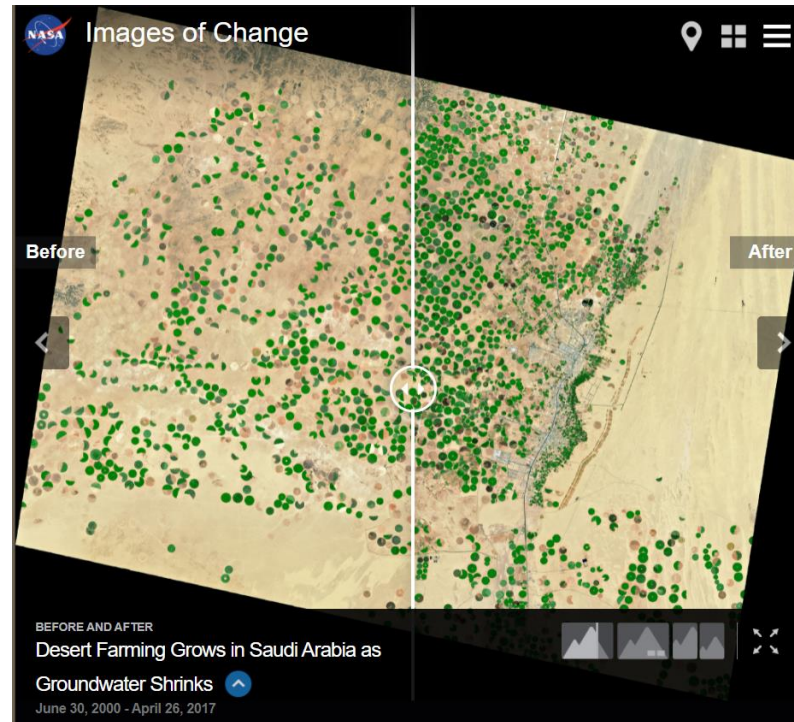


Ice in the Beaufort Sea, off the Arctic Ocean, suffered significant fracturing and breakup by mid-April in 2016, considerably earlier than the late-May period when this usually happens. NASA ice specialists attribute the **change to unusually warm air temperatures** during the first months of the year and to strong winds **caused by a stalled high-pressure system over the area**. The thicker, multi-year ice that once covered the region has largely given way to seasonal, first-year ice that is thinner, weaker and more easily broken up by strong winds.

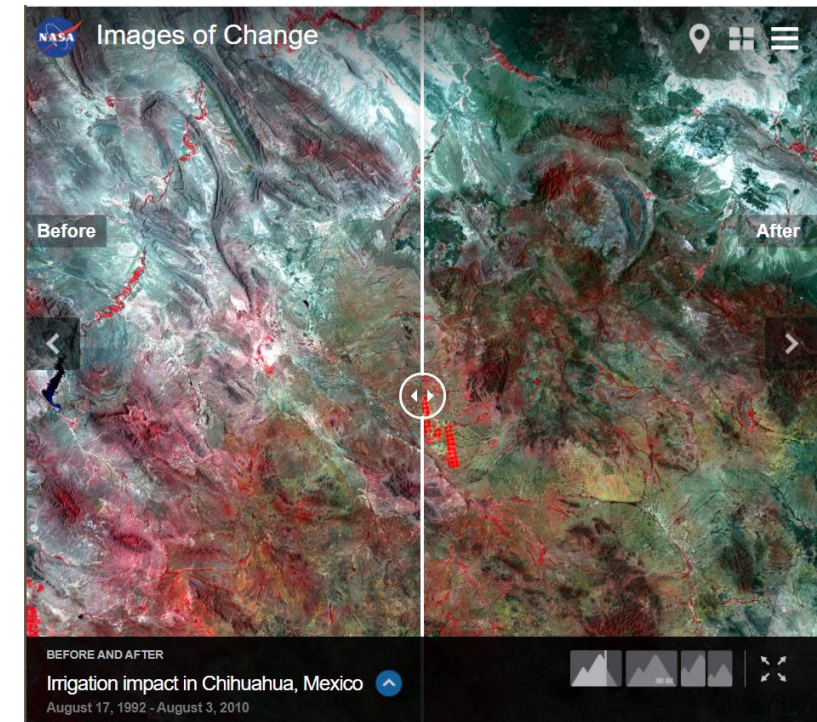
# Effects of climate change on human impact



The 2019 image shows an area of Papua (also known as Western New Guinea) where the **forest was cleared** between 2011 and 2016, reportedly to make way for **plantation agriculture**.

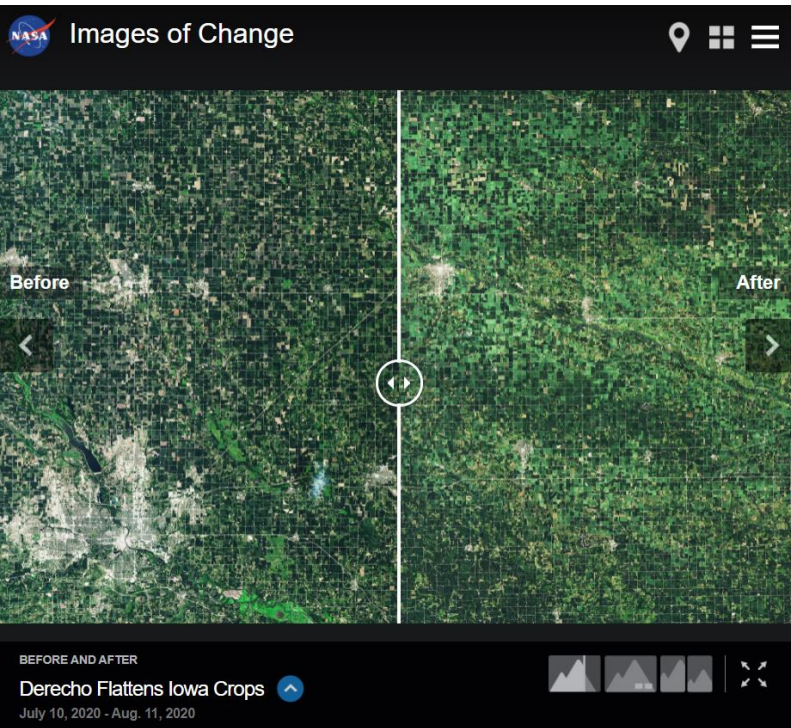


These images show an **increase in crops** near the **Saudi Arabian town** of Wadi ad-Dawasir, **which are irrigated with a shrinking supply of groundwater**. Studies using data from NASA's GRACE satellite system found that the Arabian Peninsula has the most stressed of the world's 37 largest aquifers, especially in this part of the aquifer. According to a UN report, the **water table here has dropped** some 20 feet (6 meters) per year since the 1980s, prompting fears that the **aquifer could be depleted within a few more decades**.

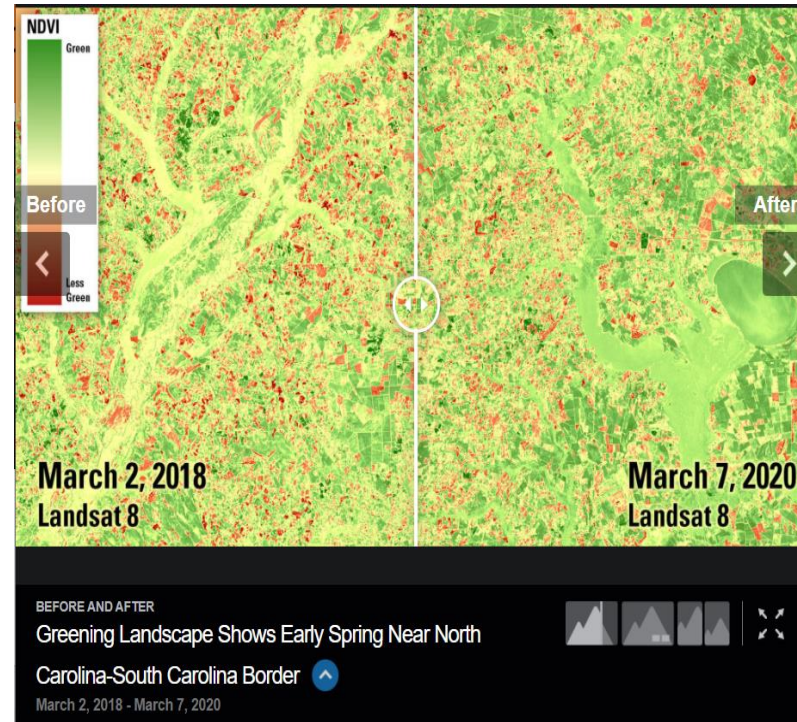


These images illustrate major changes in agricultural practices in the Mexican state of Chihuahua. Increased diversion of water from the Luis L. Leon **Reservoir for agricultural irrigation** has **affected vegetation patterns** in the northeastern part of Chihuahua and significantly **reduced the amount of water reaching the Rio Grande River**. Farmers use center pivot irrigation systems (marked by red circles) to grow alfalfa and sorghum for dairy farms and cattle feedlots. The **drop in water supplying the Rio Grande** seriously **threatens wildlife habitat and natural vegetation**.

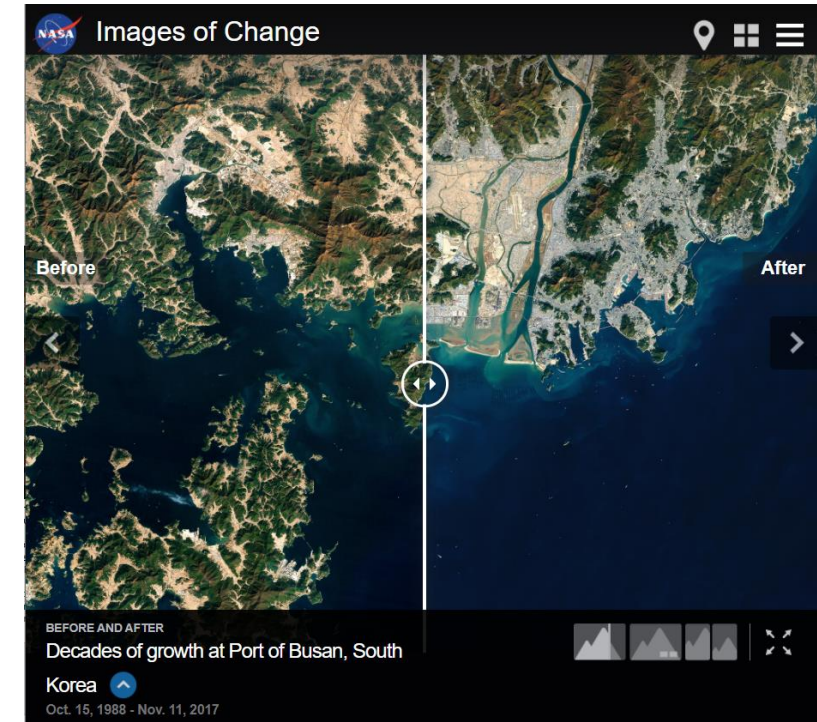
# Effects of climate change on land cover



A powerful windstorm, known as a derecho, tore across Iowa, northern Illinois, and northern Indiana on Aug. 10, 2020, with hurricane-force winds of 75 mph (120 kph) or more. Eastern Iowa saw gusts of up to 115 mph (185 kph), according to the National Weather Service. These images show fields of corn and soybeans in that state, before and after the storm. The lighter greens of the August image indicate crops that the winds damaged.

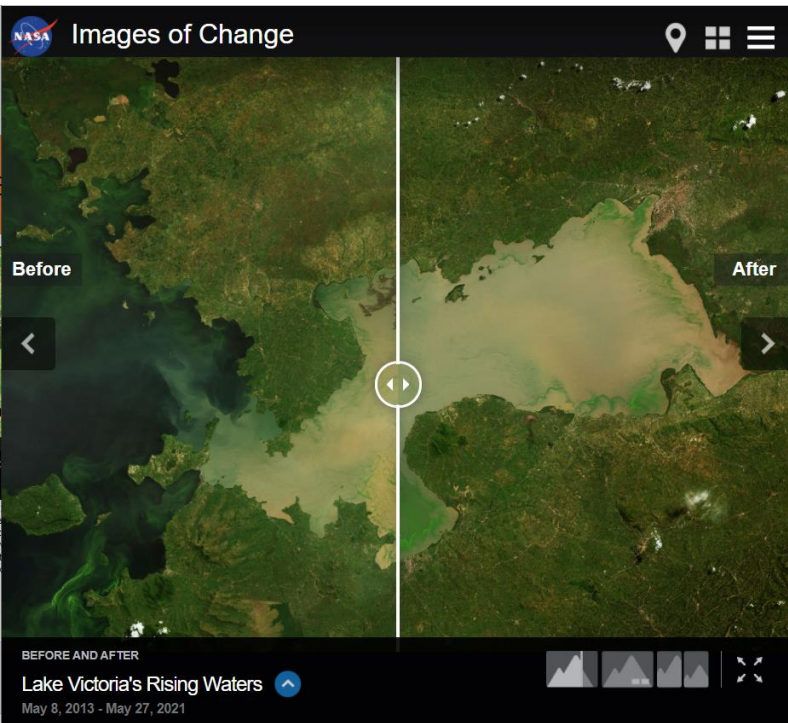


In much of the U.S., spring began unusually early in 2020. These images compare an area near the border of North and South Carolina in early March of 2018 and 2020. In the latter year, the area saw its earliest eruption on record of leaves and flowers. The two images wouldn't look very different in natural color. But in these false-color images, made from both visible and infrared light, springtime vegetation is highlighted with darker and more widespread shades of green.



These images show changes from 1988 to 2017 in the Port of Busan region at the southeastern tip of the Korean Peninsula, including the addition of Busan New Port near Gadeok Island. The World Shipping Council ranks Busan, which has been a trading hub since at least the 15<sup>th</sup> century, the world's fifth busiest container port. The images also show that three barrier islands at the mouth of the Nakdong River have shifted positions and grown slightly larger during this period. South of the islands, rows of seaweed farming operations are visible in the 2017 image.

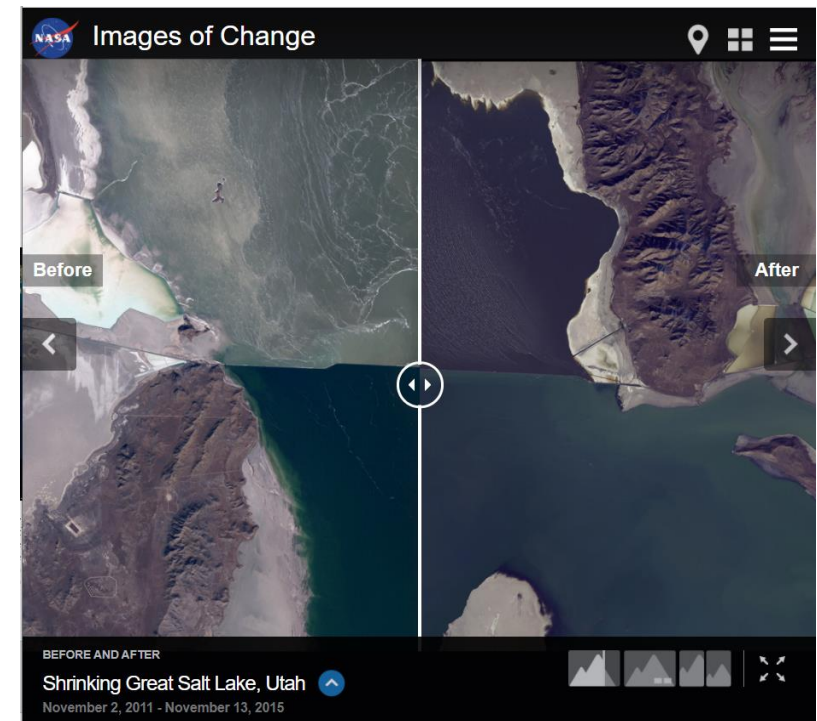
# Effects of climate change on water



These images show **changes in Winam Gulf, a northeastern extension of Lake Victoria, Africa's largest lake.** Months of intense rain raised the water level to the highest point in the three decades of measurement by satellite, putting lakeside communities at risk of flooding. Many of the green patches within the gulf are vegetation. Suspended sediment (particles of soil or other materials) colors some of the water brown.

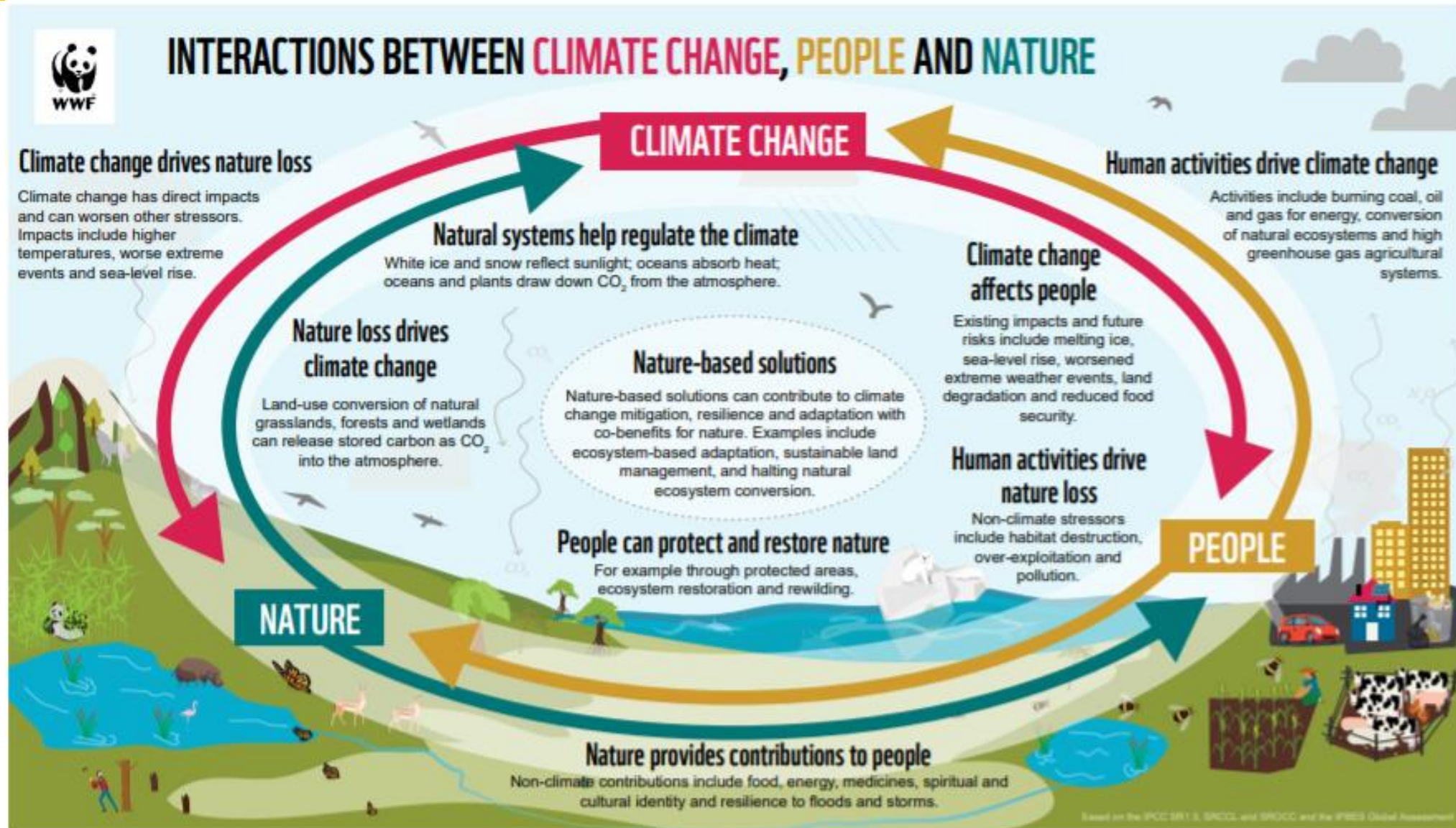


These images show a section of the Mekong River that forms a border between Laos (top) and Thailand. **Its water is normally fast-flowing and loaded with sediments that give it the muddy brown appearance seen in the 2015 image. But in the 2020 image, the river was unusually shallow and slow-moving, the result of both drought and flow-reducing dams. That enabled sediment to settle to the bottom and promoted the growth of algae, giving the river a blue-green cast.**



The **water level of the north arm of Great Salt Lake, Utah, has reached a record low of 4,191.6 feet because the smaller snowpack of recent years has reduced the spring runoff that feeds the lake. The south arm's water has dropped below the level where it could cross the breach that separates the arms. Water from the north arm is pumped to evaporation ponds, seen on the right side of these images, from which salt, potassium and other minerals are extracted.**

# Can we reverse the impacts of climate change?



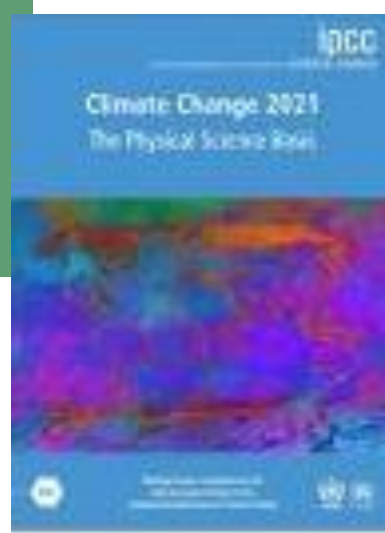
# 02

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## GLOBAL EFFORTS IN ADDRESSING AND MITIGATING CLIMATE CHANGE



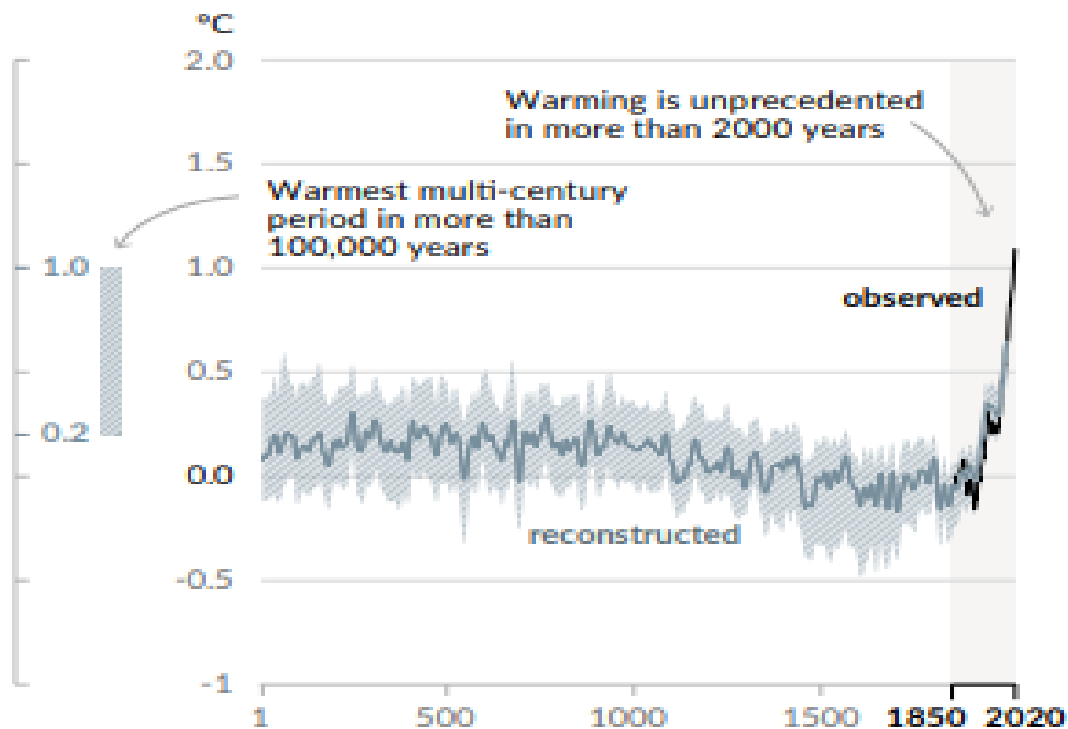
# AR6 Climate Change 2021: The Physical Science Basis



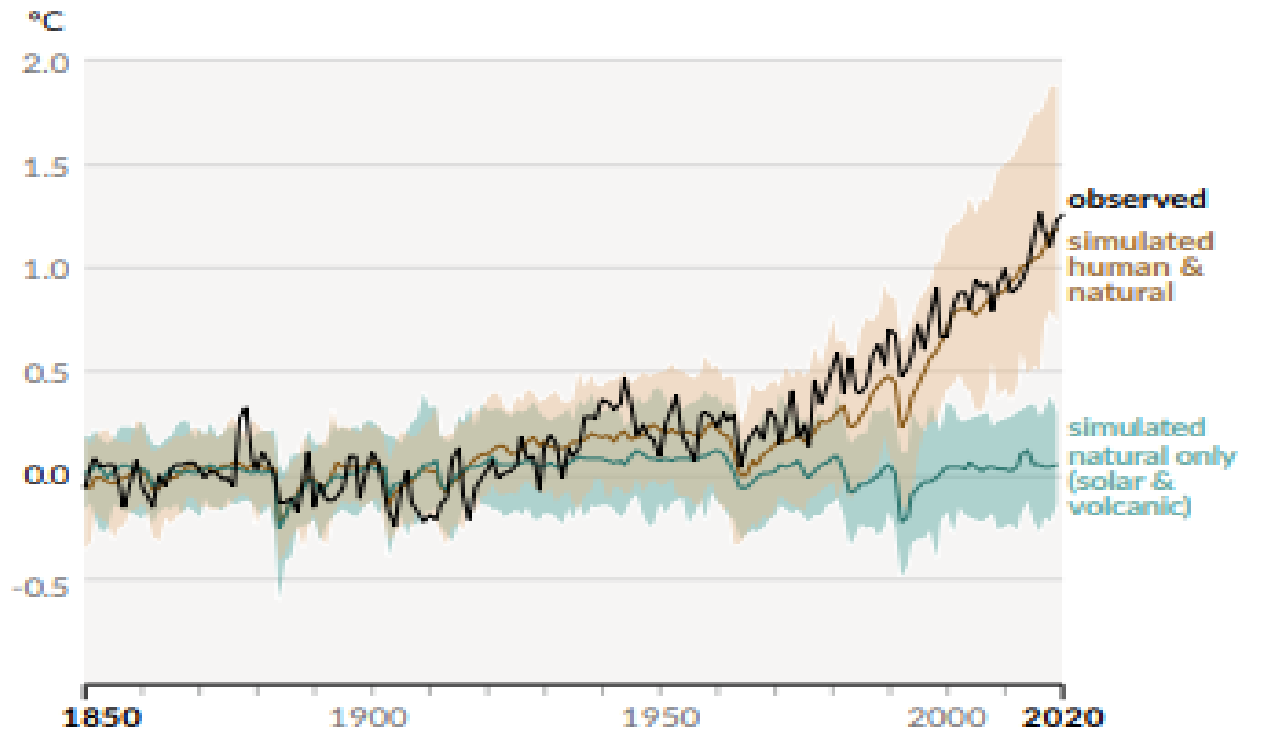
Human activities (anthropogenic activities) have contributed about 1.1°C to global warming since 1850 - 1900

## Changes in global surface temperature relative to 1850-1900

a) Change in global surface temperature (decadal average) as reconstructed (1-2000) and observed (1850-2020)



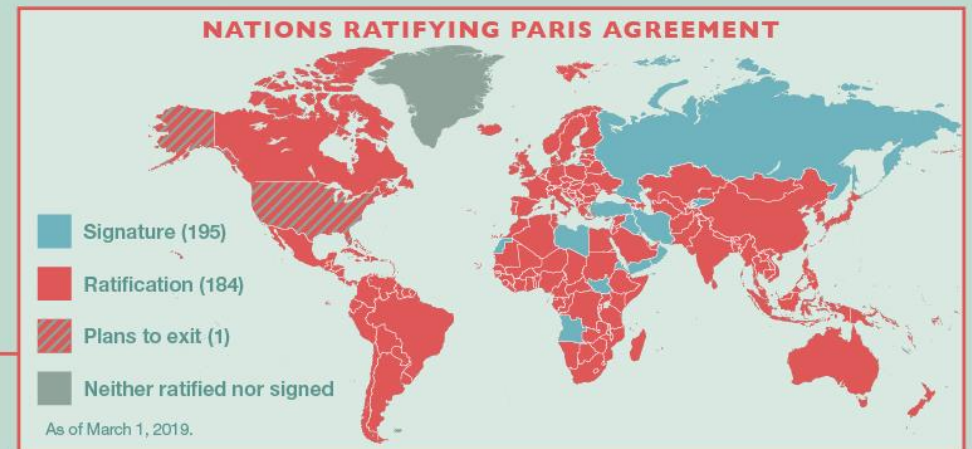
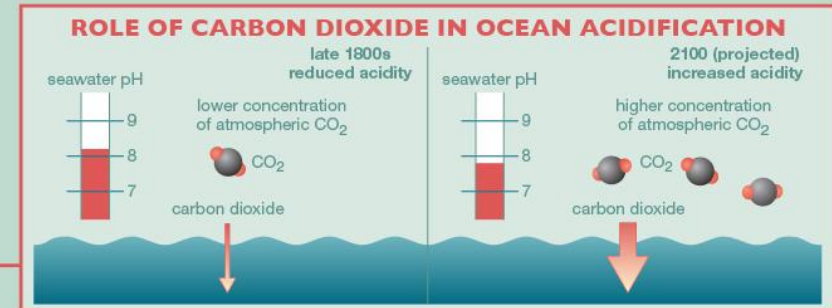
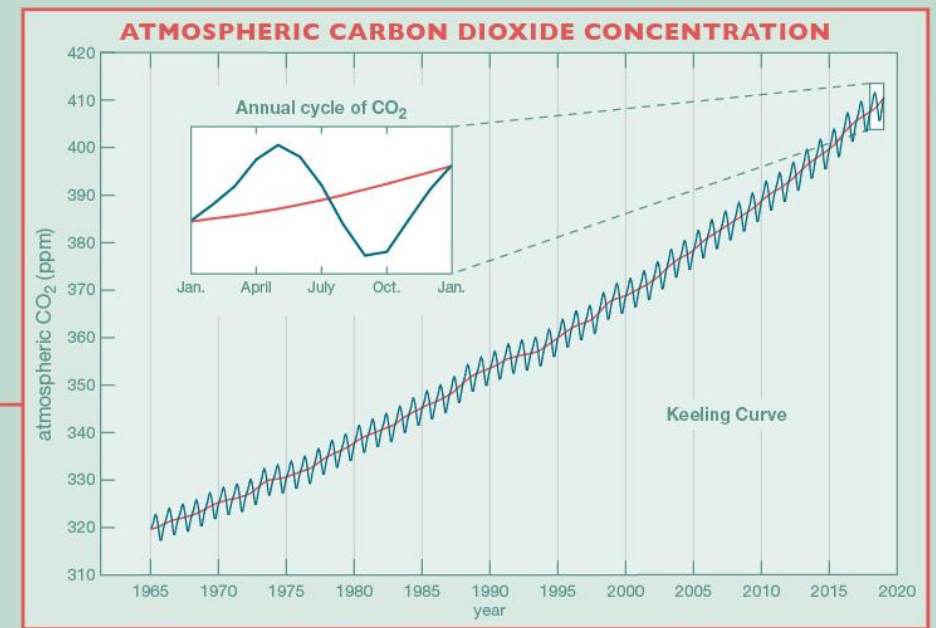
b) Change in global surface temperature (annual average) as observed and simulated using human & natural and only natural factors (both 1850-2020)



# Timeline of climate change

## TIMELINE OF CLIMATE CHANGE

- 1896** Svante Arrhenius constructs the first climate model of the influence of atmospheric carbon dioxide (CO<sub>2</sub>).
- 1920–25** Era of large-scale petroleum development begins with the opening of Texas and Persian Gulf oil fields.
- 1930s** Milutin Milankovitch publishes "Mathematical Climatology and the Astronomical Theory of Climatic Changes" to explain the causes of Earth's ice ages.
- 1957** Roger Revelle and Hans E. Suess write that "human beings are now carrying out a large scale geophysical experiment" in a paper examining CO<sub>2</sub> uptake by the oceans.
- 1960** Curve developed by American climate scientist Charles David Keeling begins to track atmospheric CO<sub>2</sub> concentrations. CO<sub>2</sub> concentration in 1960 ≈ 315 parts per million (ppm).
- 1973** First oil shock
- 1974** First evidence of chlorine chemicals being involved in ozone depletion is published.
- 1979** Second oil shock
- 1980** Keeling Curve: CO<sub>2</sub> concentration in 1980 ≈ 337 ppm.
- 1990** First Intergovernmental Panel on Climate Change (IPCC) report notes pattern of past warming while signaling that future warming is likely.
- 1992** United Nations conference in Rio de Janeiro creates the UN Framework Convention on Climate Change.
- 1997** Kyoto Protocol is created with the intent to limit greenhouse gas (GHG) emissions from industrialized countries. The U.S., the largest GHG emitter at the time, does not sign on.
- 2000** Keeling Curve: CO<sub>2</sub> concentration in 2000 ≈ 367 ppm.
- 2001** Third IPCC report notes that warming resulting from GHG emissions has become very likely.
- 2005** Kyoto Protocol goes into effect. All major industrialized countries sign on except the U.S.
- 2006** China becomes the world's largest GHG emitter.
- 2007** Fourth IPCC report notes that effects of global warming are occurring.
- 2011** Canada withdraws from the Kyoto Protocol.
- 2013** Keeling Curve: CO<sub>2</sub> concentration in 2013 ≈ 400 ppm.
- 2015** Paris Agreement (which replaces the Kyoto Protocol) is adopted by nearly 200 countries, including the U.S.
- 2016** Paris Agreement goes into effect.



# Global Cities Commitment

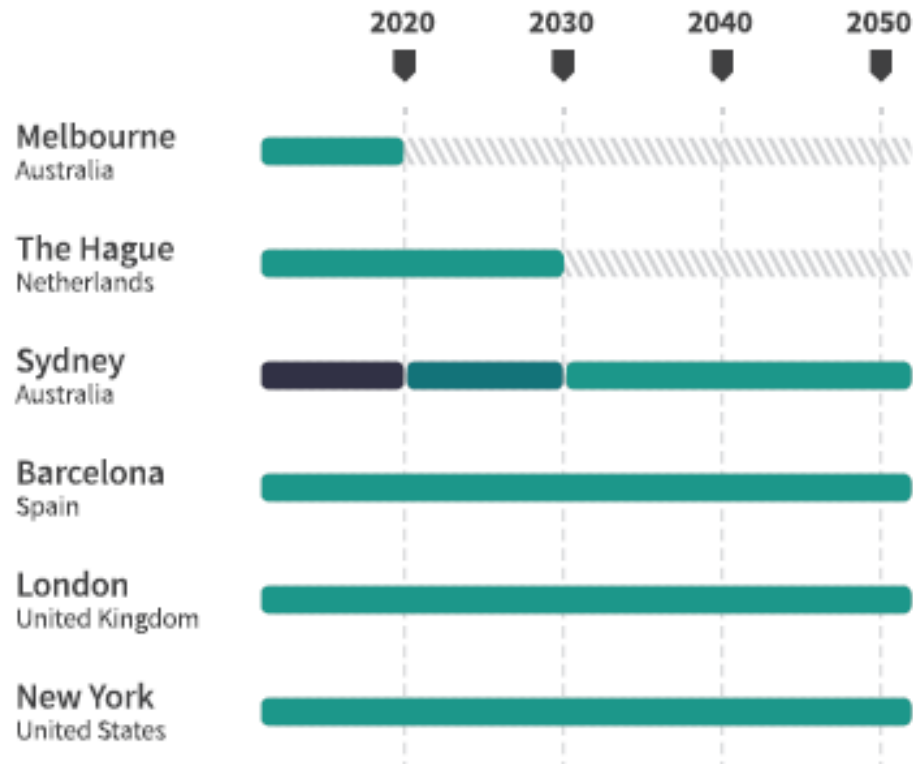


Some of the cities are doing the most to address climate change. According to Bloomberg.com, the following cities are setting out the most rigorous plans to achieve carbon or climate change neutrally by 2050.

## Pushing Green Ambition

Emission cuts against baseline

Carbon / Climate Neutrality



Paris  
France

Toronto  
Canada

Taipei  
Taiwan

Note : Includes only cities with target of 50% or more cut in emissions from their respective baseline year

Source : CDP Climate A List, Bloomberg

# Global Cities Commitment - Melbourne



## A CITY THAT CARES FOR THE ENVIRONMENT

Environmental sustainability is the basis of all Future Melbourne goals. It requires current generations to choose how they meet their needs without compromising the ability of future generations to be able to do the same.

Strategic priority 1: 100 per cent renewable energy

Strategic priority 2: Zero emissions buildings and precincts

Strategic priority 3: Zero emissions transport

Strategic priority 4: Reducing the impact of waste

- Been certified carbon neutral for our operations every year since 2012
- Cut emissions from our council operations by 53% between 2013 and 2019
- Purchased 100 per cent renewable energy through the Melbourne renewable energy project
- Planted 3000 trees a year to grow our urban forest, with over 22,000 trees planted since 2012
- Switched our major events such as Melbourne fashion week, Melbourne music week and Melbourne knowledge week to be certified carbon neutral
- Invested \$17.1 million of clean energy finance corporation funds in energy efficiency and renewable energy, including 2244 solar panels installed and 11,816 street lights
- Accelerated waste avoidance and resource recovery through centralized garbage and recycling hubs across the city.

<https://www.melbourne.vic.gov.au/sitecollectiondocuments/climate-change-mitigation-strategy-2050.pdf>

# Global Cities Commitment - Netherlands

## Press release **The Netherlands is well prepared to reduce CO2 emissions, IEA policy review says**

23 September 2020

The Climate Act has turned the focus of the Netherlands' climate policy emphatically on the long term. The act specifies a final target for 2050 and an interim target for 2030. With regard to the sector-specific targets under the national Climate Agreement, the government has not only taken into account cost-efficiency between now and 2030, but also and expressly steps that need to be taken beyond that date to achieve the 2050 target. For this reason, the first Climate Plan under the Climate Act also contains policy initiatives to prepare for the long term.

The Netherlands has focused its energy and climate policy on cutting greenhouse emissions, with targets to reduce emissions by 49% by 2030 and by 95% by 2050 from 1990 levels. In June 2019, it adopted a national Climate Agreement that was developed through a process involving diverse groups from across Dutch society that worked together to define policies and measures aimed at achieving these targets.

<https://www.iea.org/news/the-netherlands-is-well-prepared-to-reduce-co2-emissions-iea-policy-review-says>

# Global Cities Commitment – Sydney

News\_

## University of Sydney commits to climate action, sustainability

26 August 2020

Ambitious targets to help change our world

<https://www.sydney.edu.au/news-opinion/news/2020/08/26/university-of-sydney-commits-to-climate-action-sustainability.html>

## Sydney Airport commits to net zero by 2030

21 May 2021

<https://www.sydneyairport.com.au/corporate/media/corporate-newsroom/sydney-airport-commits-to-net-zero-by-2030>

Australia's Long-Term Emissions Reduction Plan is a whole-of-economy plan to achieve net zero emissions by 2050.

## Australia's Long-Term Emissions Reduction Plan

A whole-of-economy plan to achieve net zero emissions by 2050

The Plan outlines:

- 1) drive down the cost of low emissions technologies
- 2) deploy these technologies at scale
- 3) help regional industries and communities seize economic opportunities in new and traditional markets
- 4) work with other countries on the technologies needed to decarbonise the world's economy.

# Global Cities Commitment – Sydney

## NSW Government action on climate change

### NSW Climate Change Policy Framework

The NSW Government has released the NSW Climate Change Policy Framework, which commits NSW to the aspirational objectives of achieving net zero emissions by 2050 and helping NSW to become more resilient to a changing climate.

The policy framework defines the NSW Government's role in reducing carbon emissions and adapting to the impacts of climate change.

The NSW Government is providing energy bill relief for households and businesses through programs to promote energy efficiency:

- discounts on high efficiency fixed appliances for households
- discounts for small businesses to upgrade to energy saving equipment
- training for small businesses to save energy and money
- energy efficiency support for manufacturers
- more efficient street lighting
- new energy efficiency standards for appliances, buildings and infrastructure
- the Net Zero Plan programs, including the NSW Electric Vehicle Strategy; the Net Zero Industry and Innovation Program; the Hydrogen Program; the Energy Security Safeguard; and other energy efficiency programs for households and businesses.

<https://www.environment.nsw.gov.au/topics/climate-change/nsw-climate-change-fund/programs>

# Global Cities Commitment – Barcelona

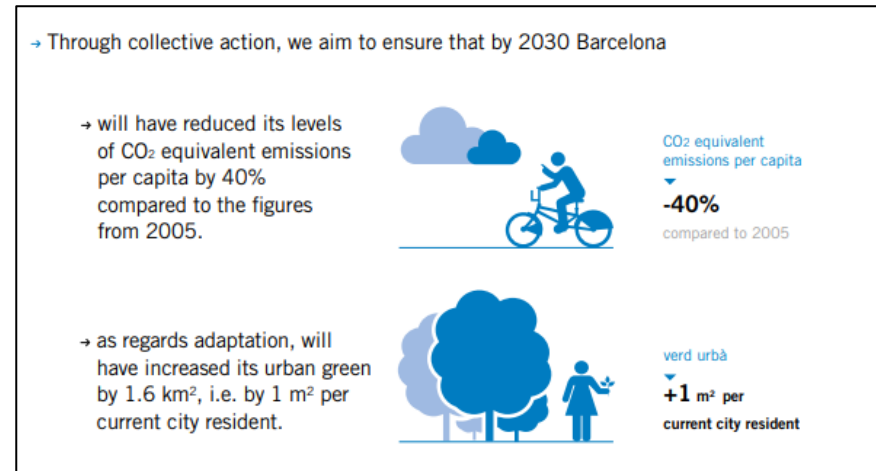


To reach the target of reducing emissions by 45% by 2030, on route to being carbon neutral by 2050, the Barcelona Climate Plan 2018 - 2030 sets five main priority areas and 18 action areas, which are outlined below:

- 1) People First
- 2) Starting at home
- 3) Transforming communal spaces
- 4) Climate economy
- 5) Building together

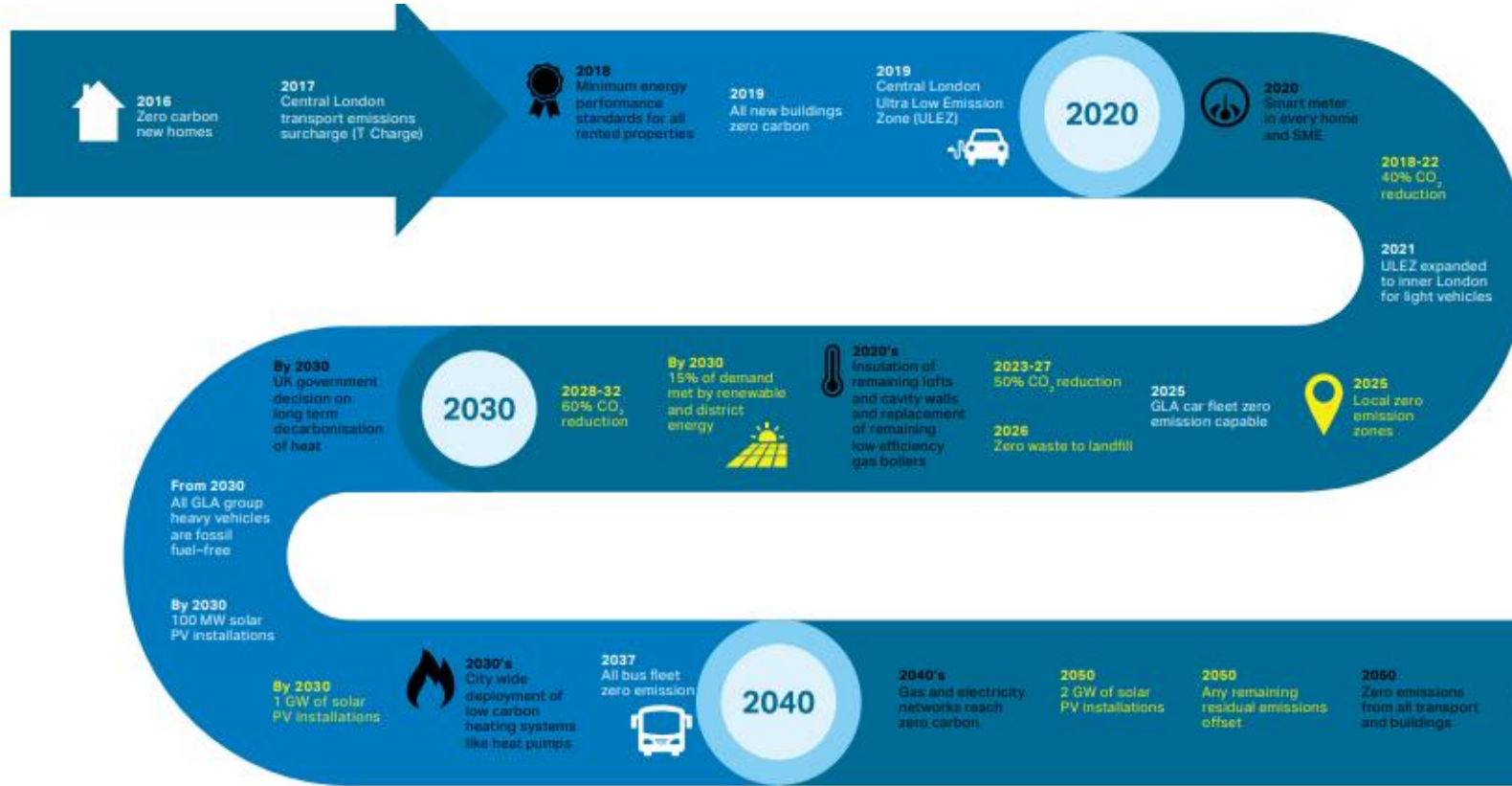
[https://www.c40knowledgehub.org/s/article/Barcelona-s-Climate-Action-Plan-2018-2030?language=en\\_US#:~:text=Barcelona's%20Climate%20Plan%202018%20%2D%202030,becoming%20carbon%20neutral%20by%202050.](https://www.c40knowledgehub.org/s/article/Barcelona-s-Climate-Action-Plan-2018-2030?language=en_US#:~:text=Barcelona's%20Climate%20Plan%202018%20%2D%202030,becoming%20carbon%20neutral%20by%202050.)

<https://ajuntament.barcelona.cat/ecologiaurbana/sites/default/files/Barcelona%20Committedement%20to%20Climate.pdf>





# Global Cities Commitment – London



## 1.5C Compatible Plan

An analysis of the different routes to becoming a zero carbon city.



## Green New Deal Fund

The Mayor fund to support projects that will boost green jobs and tackle air pollution and the climate emergency.



## MEEF

The Mayor of London's Energy Efficiency Fund (MEEF) is a £500m investment fund to deliver the low carbon projects



## Business Climate Leaders

The Mayor of London is working with businesses to help step up the fight against climate change.

## What is needed by 2050?

To make London a zero carbon city requires action from the Mayor, businesses, communities, boroughs and national government.



## Divestment

The Mayor is taking action to divest London's pension funds from fossil fuels and is working with others to join him.



## Wider climate impacts

Measuring the impact of greenhouse gases beyond London's boundaries

# Global Cities Commitment – New York

## What is New York doing about Climate Change?

### Plans and Programs

#### Statewide Climate Planning

[Climate Leadership and Community Protection Act](#)  
[Climate Risk and Resiliency Act](#)  
[Climate Smart Communities Charge NY](#)  
[Transportation and Climate Initiative](#)

**New York just passed the most ambitious climate target in the country**

Carbon-free electricity by 2040 and a net-zero carbon economy by 2050.

By David Roberts | @drvolts | Updated Jul 22, 2019, 8:56am EDT

#### Greenhouse Gas Inventory and Reduction

[Regional Greenhouse Gas Initiative \(RGGI\)](#)  
[Build Smart NY](#)

**New York City's Net-Zero Carbon Target for 2050 Is Achievable, Study Finds**

*Landmark joint study provides most comprehensive analysis to date of scenarios for NYC's energy supply and demand through midcentury*

[Read the full study](#)

April 15, 2021

**NEW YORK** – New York City can achieve carbon neutrality by 2050 through a dramatic ramp-up of renewable energy, deep emissions cuts across its buildings and transportation sectors, and

#### Renewable Energy

[Renewable Energy Portfolio Standard](#)  
[Small Wind Turbine Program](#)  
[Renewable Heat NY](#)  
[NY Sun](#)

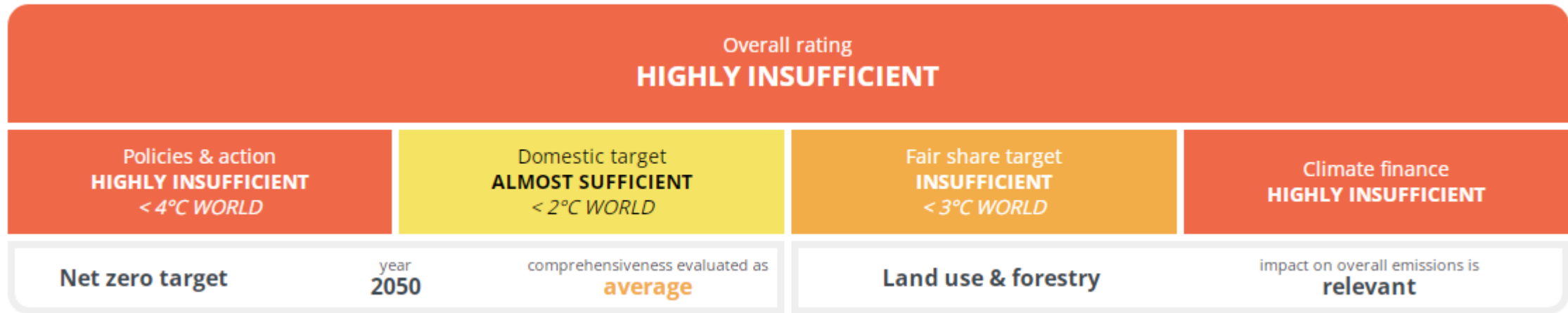
# Global Cities Commitment – Paris

## The Paris Agreement



1. The Paris Agreement is a landmark international accord that was adopted by nearly every nation in 2015 to address climate change and its negative impacts.
2. The agreement aims to substantially reduce global greenhouse gas emissions in an effort to limit the global temperature increase in this century to 2 degrees Celsius above preindustrial levels, while pursuing the means to limit the increase to 1.5 degrees.
3. The agreement includes commitments from all major emitting countries to cut their climate pollution and to strengthen those commitments over time.
4. The Paris Agreement is a legally binding international treaty on climate change. It was adopted by 196 Parties at COP 21 in Paris, on 12 December 2015 and entered into force on 4 November 2016.

# Global Cities Commitment – Canada



<https://climateactiontracker.org/countries/canada/>

1. The 2016 Pan-Canadian Framework on Clean Growth and Climate Change (PCF) is Canada's first-ever national climate plan that was developed with provinces and territories, and in consultation with Indigenous peoples.
2. In December of 2020, the Government of Canada introduced A Healthy Environment and a Healthy Economy – Canada's strengthened climate plan.
3. Canada is now on a path to exceed its 2030 Paris Agreement emissions reduction target and has the building blocks in place to get to a prosperous net-zero emissions future by 2050.

## Canada's Climate Actions for a Healthy Environment and a Healthy Economy

The *Canada's Climate Actions for a Healthy Environment and a Healthy Economy* report provides an overview of climate actions taken in Canada. As committed in December 2020, a path forward on pricing carbon is also included.

## Net-Zero by 2050

The move to a cleaner, prosperous economy needs to be both an immediate priority and a sustained effort over the years and decades ahead. To meet this long-term goal, Canada needs to keep innovating, strengthening, and building on existing measures.

That is why Canada is committed to achieving net-zero emissions by the year 2050 and why the Government introduced the *Canadian Net-Zero Emissions Accountability Act* in Parliament on November 19, 2020. The Act, once passed, will formalize Canada's 2050 target, and establish a series of interim emissions reduction targets at 5-year milestones toward that goal.

# Global Cities Commitment – Taiwan

## Sgro and Chen: Let Taiwan play a part in the global effort to fight climate change

*Although it has slowed the growth of its greenhouse gas emissions more than any country in Asia since 2015, Taiwan is excluded from the United Nations Framework Convention on Climate Change (UNFCCC) because of political pressure from China.*

Judy Sgro, Winston Wen-yi Chen

Oct 26, 2021 • 1 day ago • 3 minute read • [Join the conversation](#)

## Taiwan Can Help (with climate change)

Taiwan Climate Alliance spearheaded by Vice President Lai Ching-te making a difference

[1443](#) [Tweet](#) [分享](#) [Share](#) [Like 22](#)

By William Wu, Taiwan News, Contributing Writer

2021/09/02 17:22

## Taiwan eyes net zero emissions by 2050

Impact of climate change prompting country to join global cause of going carbon neutral

[1790](#) [Tweet](#) [分享](#) [Share](#) [Like 65](#)

By Huang Tzu-ti, Taiwan News, Staff Writer

2021/08/31 10:29

April 22, 2021

1:59 PM +08

Last Updated 7 months ago

Environment

## Taiwan begins to plan for zero emissions by 2050

## As Taiwan models net zero scenarios, campaigners push for 2050 target

Published on 14/12/2020, 2:30pm

<https://ottawacitizen.com/opinion/sgro-and-chen-let-taiwan-play-a-part-in-the-global-effort-to-fight-climate-change>

<https://www.taiwannews.com.tw/en/news/4280724>

# 03

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## MALAYSIA EFFORTS IN ADDRESSING AND MITIGATING CLIMATE CHANGE

# Engagement with the international community

## Engagement with the International Community

### UNFCCC

Signed: 9 June 1993

Ratified: 13 July 1994

### Kyoto Protocol

Signed: 12 March 1999

The **Kyoto Protocol** is an international agreement linked to the United Nations Framework Convention on Climate Change which was adopted on 11 December 1997 and came into force on 16 February 2005. The Protocol, which has been ratified by Malaysia, encourages a reduction in the emission of harmful gases from industries, and sets binding targets for 37 industrialized countries (Annex I countries) and the European community for reducing greenhouse gas emissions.

The **Paris Agreement** under the United Nations Framework Convention on Climate Change (UNFCCC) was adopted in 2015. The objective of the Agreement is to strengthen the global response to the threat of climate change. The aim is to keep global temperature rise well below 2 degrees Celsius above pre-industrial levels, and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius.

## < Malaysia

Type of Party  
Non-Annex I

Ratification status

### Paris Agreement

Date of signature: 22 April 2016

Date of ratification: 16 November 2016

### Kyoto Protocol

Date of signature: 12 March 1999

Date of ratification: 04 September 2002

# Malaysia's first Nationally Determined Contribution

## Malaysia's First Nationally Determined Contribution

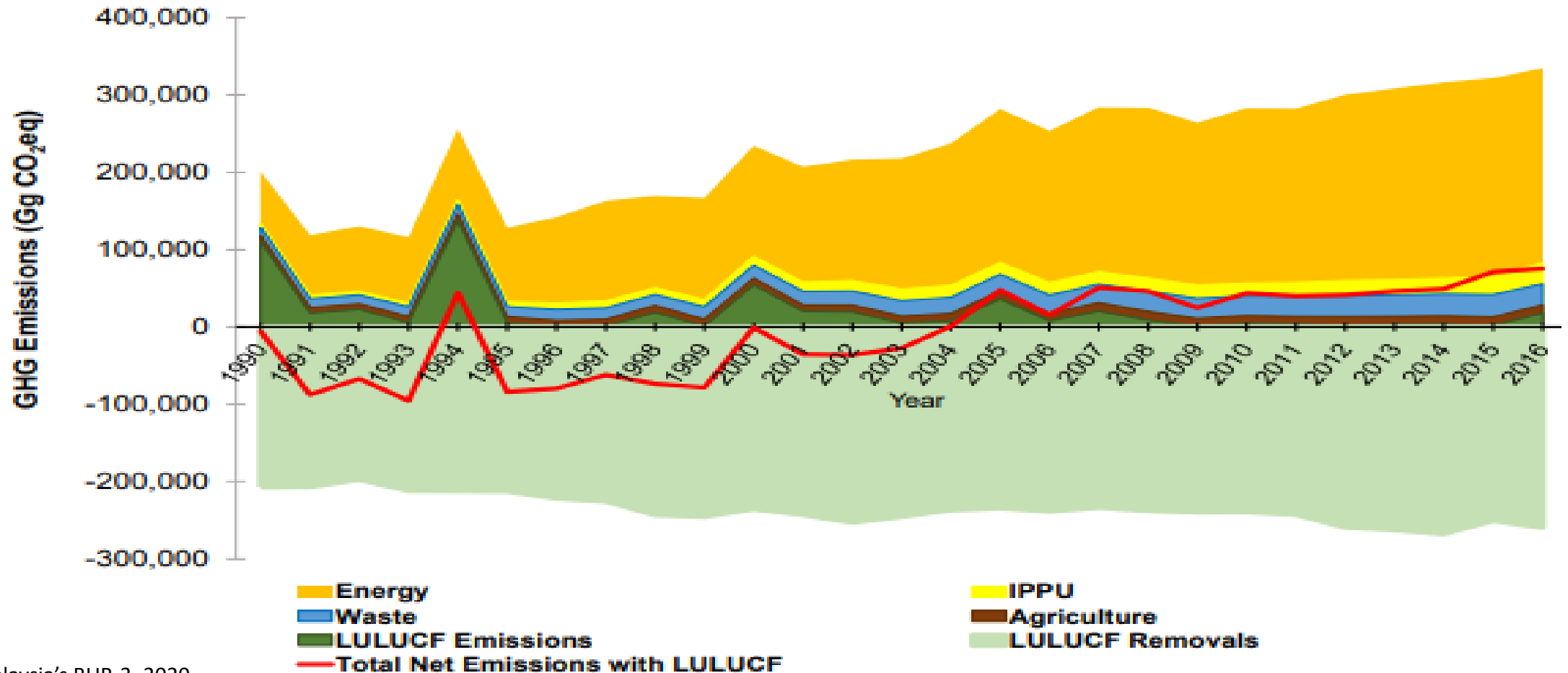
(Updated Submission 30.7.2021)

"Malaysia intends to reduce its economy-wide carbon intensity (against GDP) of 45% in 2030 compared to 2005 level. The updated NDC includes the following increased ambition:

- The 45% of carbon intensity reduction is unconditional;
- This target is an increase of 10% from the earlier submission;
- The GHG coverage is expanded from three (3) to seven (7) GHGs:
  - Carbon dioxide (CO<sub>2</sub>)
  - Methane (CH<sub>4</sub>)
  - Nitrous oxide (N<sub>2</sub>O)
  - Hydrofluorocarbons (HFCs)
  - Perfluorocarbon (PFCs)
  - Sulphur hexafluoride (SF<sub>6</sub>)
  - Nitrogen trifluoride (NF<sub>3</sub>).



# Malaysia Sectoral Time Series of GHG Emissions from 1990 to 2016



SOURCE: Malaysia's BUR-3. 2020

# Major Sources of GHG in Malaysia



IPPU = Industrial Processes and Product Use  
LULUCF = Land Use, Land Use Change and Forestry

Source: Malaysia's BUR3 (2020)

# Mitigation actions and key adaptation actions



## Mitigation Actions

- Renewable Energy & Energy Efficiency
- Transportation
- Recycling activities
- Biogas recovery from palm oil
- Forestry

## Key Adaptation Actions

- Addressing flood
- Coastal protection
- Water and food security
- Public health

Source: Malaysia's BUR-3, 2020

# Key climate change tasks 2021/2022



## Key Climate Change Tasks 2021/2022

- Malaysia Climate Change Council (MyCAC) ✓
- Completion of Malaysia's Updated NDC to UNFCCC ✓
- Preparation of Malaysia's 4<sup>th</sup> NC & BUR to UNFCCC (NC-4 & BUR4)
- Development of climate change legal framework
- Development of carbon market mechanism
- Review of 2009 Climate Change Policy
- Malaysia's Long Term Low Emissions Development Strategy (LT-LEDS)
- National Adaptation Plan – NAP
- Establishment of Green House Gas Inventory Centre
- National Low Carbon Cities Blueprint ✓
- National Low Carbon Mobility Blueprint ✓

**04**

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**NATIONAL LOW CARBON CITIES  
MASTERPLAN**

# Definition of low carbon cities

There is no single or universal definition for low carbon development or low carbon cities. However, the masterplan has defined Low Carbon Cities as follows :

**A low carbon city is defined as a city that implements low carbon strategies to meet its environmental, social and economic needs of the city. The city measures, manages and mitigates greenhouse gas emissions to reduce its contribution to climate change.**

The definition emphasizes on **three (3)** main elements :

- ➔ **1. Pursue a systematic approach** – i.e. establish documented strategies and action plans;
- ➔ **2. Employ area wide strategies** – i.e. cover all potential emission sectors within city boundary; and
- ➔ **3. Set ambitious GHG reduction target** – i.e. establish baseline/peak as well as short and long term reduction targets. Note: ‘ambitious’ refers to GHG reduction target that surpass the national GHG target and towards carbon neutrality.

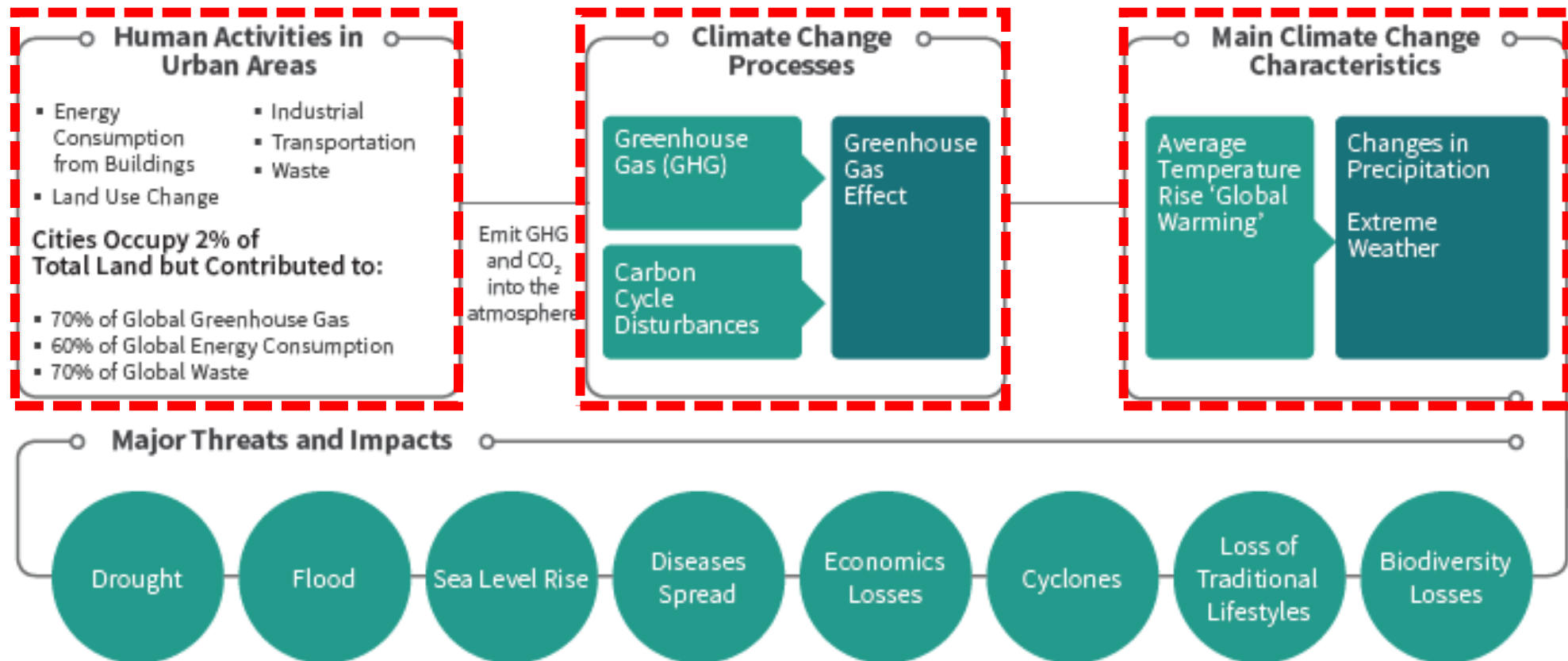
Essentially, low carbon cities are defined as cities with specific strategies, plans and targets on how to reduce GHG emissions that covers all potential emitting sectors within the city boundary.

# Cities, urbanization and GHG emissions



Cities are the main engines for a dynamic economic growth and the focal points of most population. However the process of urbanization has contributed significantly to the increase of GHG emissions. Thus, fostering urban development in the most sustainable manners can reduce energy demand, consumption and GHG emissions.

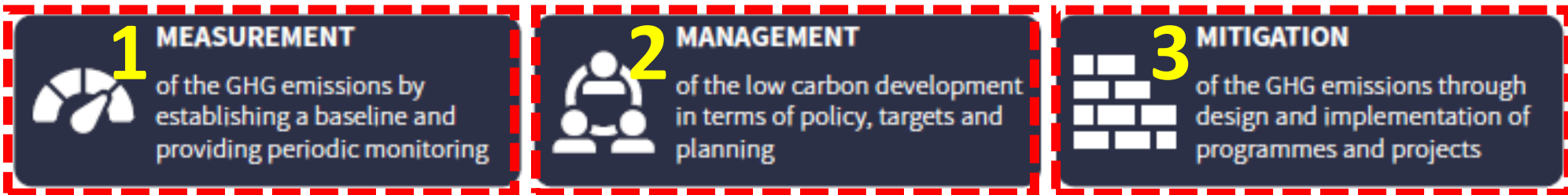
Cities and urbanization increase the proliferation of CO<sub>2</sub> and GHG emissions



# The 3M approach



The 3M approach is introduced to guide cities to position themselves as major players in climate change mitigation, as well as set an example for the development of emission reduction strategies at the local level. The 3M approach consists of three (3) actions below:



It is essential that cities **measure and establish an inventory** of their GHG emissions for :

- Assessing and monitoring their efforts in addressing climate change
- Evaluating mitigation options in assessing the effectiveness of policies and measures
- Making long-term emission projections (i.e. setting targets)

- It is also imperative that cities develop as well as update strategies/action plans to serve as a guide in the implementation of mitigation measures at local level.
- These **documented strategies or action plans** signify the systematic approach in carrying out the cities' reduction strategies.

- Mitigation is being referred to **measures and actions** taken to reduce GHG emissions.


*Note :*  
*Adaptation is not directly part of the 3M Approach as adaptation addresses the impacts of climate change. All adaptation measures are based on reducing vulnerability to climate impacts. But adaptation can be part of the mitigation effort to establish a more resilient city.*



# Key challenges



Seven (7) key challenges were recognized as barriers to low carbon pathway in most Malaysian cities

<b>1</b>  <b>Policies and Direction</b>	<b>2</b>  <b>Implementation and Execution</b>	<b>3</b>  <b>Source of Funding and Financing</b>	<b>4</b>  <b>Low Carbon Development in Urban Planning</b>
<ul style="list-style-type: none"><li>▪ Inconsistent implementation</li><li>▪ Gap in transition from top to bottom</li><li>▪ No specific reference to low carbon agenda</li><li>▪ Intensity versus absolute targets</li></ul>	<ul style="list-style-type: none"><li>▪ Inconsistent implementation</li><li>▪ Not mandatory</li><li>▪ Absence of dedicated unit/entity at all levels</li></ul>	<ul style="list-style-type: none"><li>▪ Insufficient and still lacking</li><li>▪ No dedicated fund</li><li>▪ Legal barriers for local government to generate additional income</li><li>▪ Lack of incentives</li></ul>	<ul style="list-style-type: none"><li>▪ Weak integration between low carbon reduction strategies and existing development's document</li><li>▪ Conflicting and competing development priorities</li></ul>
<b>5</b>  <b>Community Participation</b>	<b>6</b>  <b>Capacity, Capability and Readiness</b>	<b>7</b>  <b>Data for GHG Inventory</b>	
<ul style="list-style-type: none"><li>▪ Weak in public appreciation and understanding</li><li>▪ Lack of opportunities to participate</li></ul>	<ul style="list-style-type: none"><li>▪ Shortage of capable people</li><li>▪ Lack of skills and understanding</li><li>▪ Lack of subject matter experts</li></ul>	<ul style="list-style-type: none"><li>▪ Weak in availability and access</li><li>▪ Lack of proper data</li><li>▪ Weak in accuracy</li><li>▪ Inconsistent methodology</li></ul>	



# Target cities and others cities

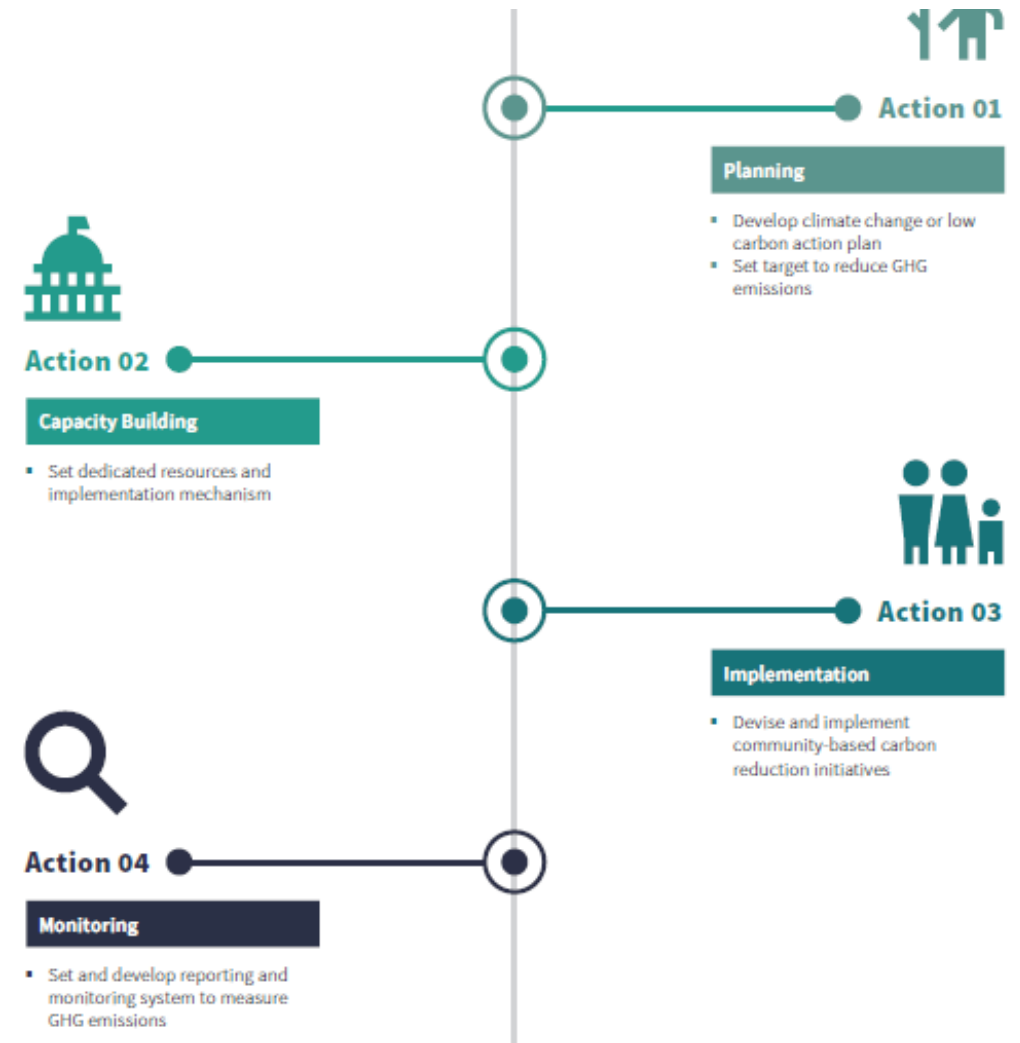
➔ A total of 33 local and regional government has been selected as Target Cities. The main criteria for the selection is the total number of population in the city/area must exceed 300,000 - based on the 2010 census data by the Department of Statistics of Malaysia - with exception for Putrajaya Corporation, Kulai Municipal Council, Pasir Gudang City Council, Pontian District Council, Sepang Municipal Council and Hang Tuah Jaya Municipal Council.

Details of 33 Selected Target Cities

Group 1	Group 2	Group 3
1. Hang Tuah Jaya Municipal Council	1. Alor Setar City Council	1. Kota Bharu Municipal Council
2. Iskandar Malaysia	2. Ampang Jaya Municipal Council	2. Kota Kinabalu City Hall
3. Iskandar Puteri City Council	3. Ipoh City Council	3. Kuala Terengganu City Council
4. Johor Bahru City Council	4. Kajang Municipal Council	4. Kuantan City Council
5. Kuala Lumpur City Hall	5. Klang Municipal Council	5. Sandakan Municipal Council
6. Kulai Municipal Council	6. Kuching North City Hall	6. Sungai Petani Municipal Council
7. Melaka Historic City Council	7. Kuching South City Council	7. Tawau Municipal Council
8. Pasir Gudang City Council	8. Miri City Council	
9. Penang Island City Council	9. Selayang Municipal Council	
10. Petaling Jaya City Council	10. Seremban City Council	
11. Pontian District Council	11. Subang Jaya City Council	
12. Putrajaya Corporation		
13. Seberang Perai City Council		
14. Sepang Municipal Council		
15. Shah Alam City Council		



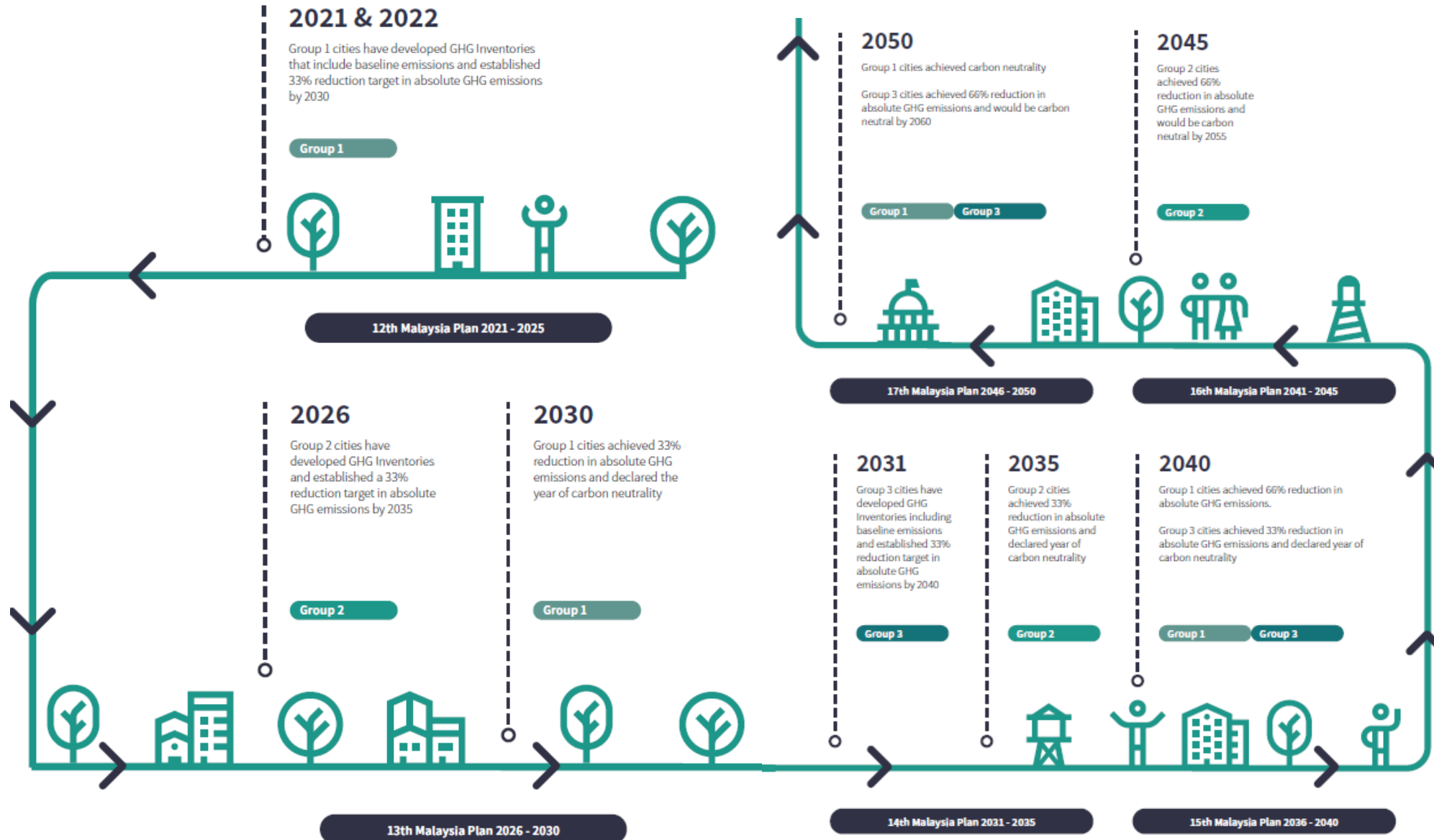
Cities that are not selected as target cities, but are keen in implementing mitigation measures to reduce GHG emissions can undertake the following actions as vital steps in paving the pathway to low carbon cities or low carbon development.



# Absolute carbon reduction targets



The timeline and absolute carbon reduction targets for target cities by 2030 until 2050 are as follows:



**05**

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**MALAYSIA CITIES COMMITMENT**

# Low carbon cities 2030 challenge

## LOW CARBON CITIES 2030 CHALLENGE



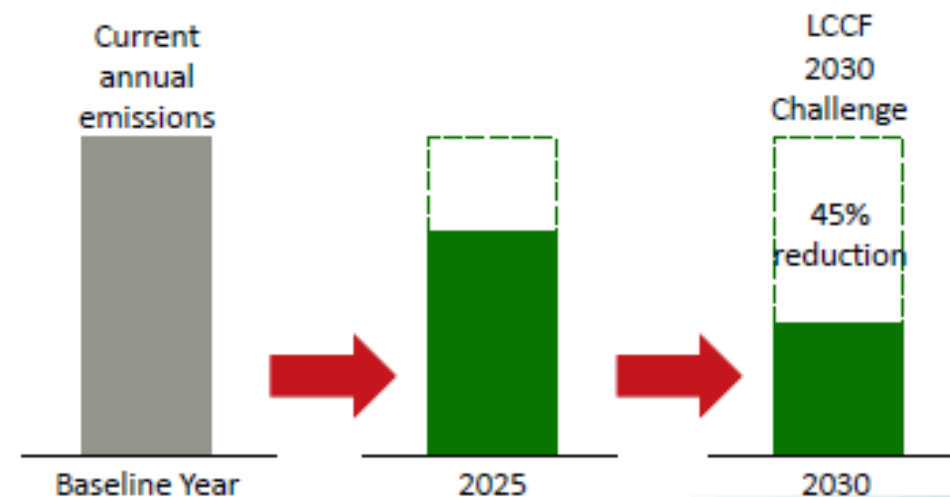
Cities are responsible for over 70% of GHG emissions.

Reducing these emissions is key to addressing climate change and meeting Malaysia's commitment to the Paris Climate Agreement.

To accomplish this, MGTC is introducing the Low Carbon Cities 2030 Challenge.



200 Low Carbon Zones (5D) by 2030  
1,000 Low Carbon Partners (5D) by 2030



# Low carbon cities 2030 challenge



## LCC 2030 CHALLENGE DRIVING FORCE

### DRIVER 1

Malaysia's commitment to reduce GHG emissions intensity by 45% by 2030.

**KOMITMEN MALAYSIA TERHADAP THE PARIS AGREEMENT**

**12 Disember 2015**  
195 negara telah bersefua Paris Agreement melalui Perundingan 1.5-21 Kōnvensyen Bangsa-Bangsa Perubahan Iklim Pertubuhan Bangsa-Bangsa Kerjasama (UNFCCC).

**22 April 2016**  
Malaysia menandatangani Paris Agreement.

**13 November 2016**  
Malaysia meratifikasi Paris Agreement.

**KOMITMEN KERAJAAN**  
1. Malaysia akan menubuhkan Majlis Kebangsaan Adaptasi dan Mitigasi Perubahan Iklim.

**KOMITMEN MESTECC**  
1. Menubuhkan Peta Tindakan Strategik Adaptasi dan Mitigasi Perubahan Iklim Malaysia.  
2. Menubuhkan dasar dan kerangka kerja untuk menggalakan pembangunan industri hijau.

YB YEO BEE YIN  
Gibang Dewan Rakyat, Kompleks Parlimen,  
Pangkal Puteri, Parlimen Kuala Lumpur  
31 Jun 2018

[www.mestecc.gov.my](http://www.mestecc.gov.my) @mestecc @MyMestecc

### DRIVER 2

To limit global warming to 1.5°C, we have to reduce GHG emissions by 45% by 2030.

**ipcc**  
INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE

# Global Warming of 1.5°C

An IPCC special report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty.

GreenTech Malaysia

# Low carbon cities 2030 challenge

## LCC 2030 CHALLENGE MOTIVATION



Low carbon cities have multiple direct and indirect benefits to the residents, businesses and the city.

4 key benefits are:

### CLEANER

- Cleaner air from reduced pollution from fossil fuel vehicles
- Cleaner environment from the reduction in waste that goes to the landfills

### COOLER

- Cooler city from increase in greenery and tree cover
- Cooler city from reduced urban heat island effect
- Cooler buildings and homes from green buildings

### HEALTHIER

- Healthier environment from reduced air pollution and contamination
- Healthier residents from increased outdoor activity in cycling and walking

### CHEAPER

- Cheaper operating cost for electricity and water from efficiency measures
- Reduced wastage from more efficient and productive use of resources



# Low carbon cities 2030 challenge

## LCC 2030 CHALLENGE FOCUS ELEMENTS & TARGETS



The LCC 2030 Challenge will focus on 5 key elements:

Reducing CO<sub>2</sub> emissions from:

- Electricity consumption from buildings and common areas
- Petrol and diesel private vehicle use
- Waste ending up in landfills
- Water consumption from buildings and common areas

Increasing CO<sub>2</sub> sequestration from:

- Trees, green spaces and water bodies

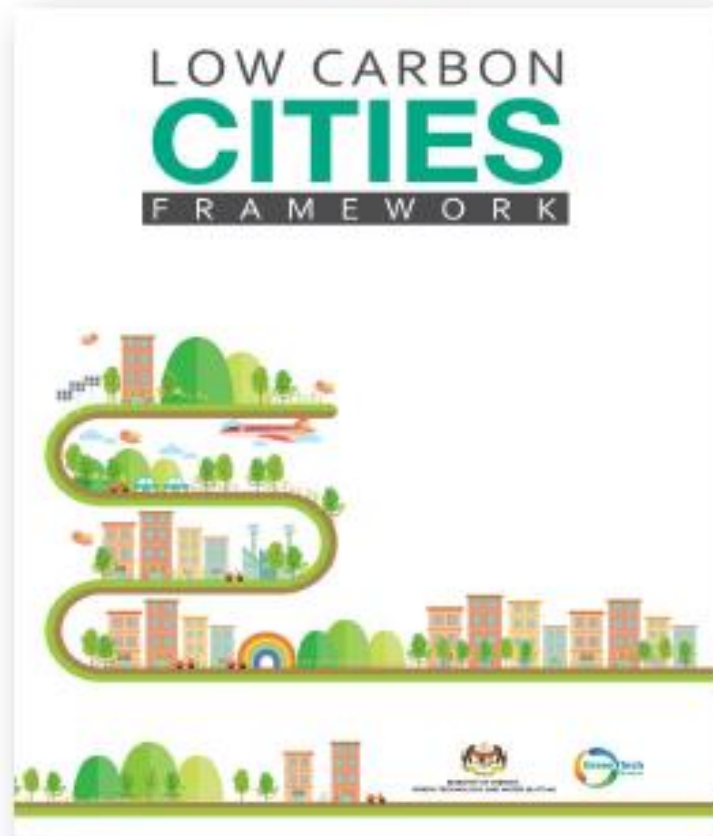
The LCC 2030 Challenge targets a total of 45% CO<sub>2</sub> emissions reduction by adopting these measures:

- **Energy:** Maximize building energy efficiency and increasing adoption of renewable energy
- **Mobility:** Increasing the use of public transport (bus), cycling, walking and other low carbon modes
- **Waste:** Reduce the amount of waste that goes to the landfills
- **Water:** Maximize water efficiency and increase adoption of rainwater harvesting

# Low carbon cities 2030 challenge

## LCC 2030 CHALLENGE REFERENCE

V2: 2017



### FOCUS ON 4 KEY ELEMENTS



#### URBAN ENVIRONMENT



#### URBAN INFRASTRUCTURE



#### BUILDING



#### URBAN TRANSPORTATION



Notes:

1. The Low Carbon Cities Framework document serves as the main reference document for Low Carbon Cities in Malaysia.
2. Main component is Chapter 3 which is a Design Guideline to give an idea of how a Low Carbon City should look like.
3. Use this to assist in developing Action Plan.
4. The LCCF Checklist document is recommended as a guide for new developments.
5. LCCF V3 is in development.

# Low carbon cities 2030 challenge

## CATEGORIES

### LOW CARBON ZONE



Applicable for (area > 50 hectares):

- Local Authorities
- Universities
- Industrial & Commercial Parks
- Economic Corridors
- Townships
- Naval & Army Base

### INDIVIDUAL BUILDING / ORGANISATION



Applicable for:

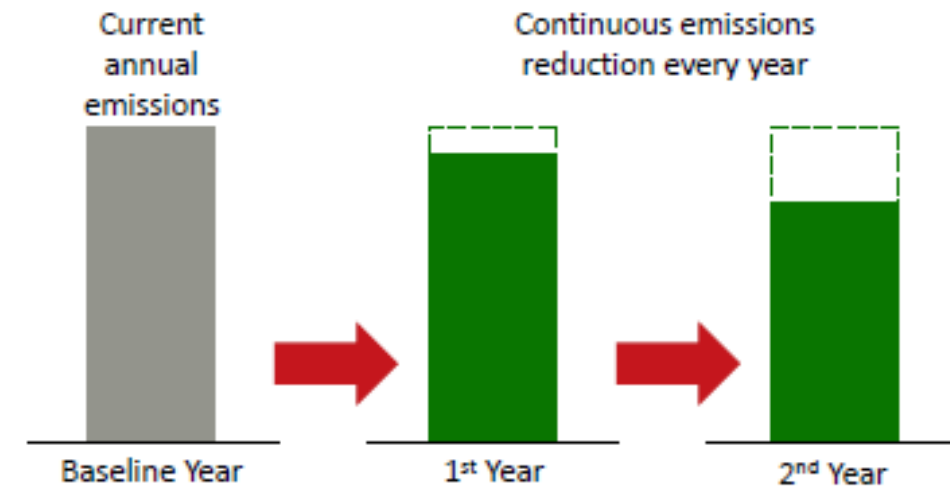
- Commercial Buildings (office, malls, hotels, etc.)
- Hospitals
- Schools
- Ports & Terminals
- Sports Complex
- Parks

# Low carbon cities 2030 challenge

## ASSESSMENT & RECOGNITION



### ASSESSMENT



4 step process:



### RECOGNITION

#### Provisional Certificate

Develop baseline and pledge commitment to reduce emissions

#### Diamond Recognition

Achieve emissions reduction based on the scale below:

	1 Diamond	1% reduction
	2 Diamonds	5% reduction
	3 Diamonds	10% reduction
	4 Diamonds	25% reduction
	5 Diamonds	45% reduction

# LCCC participation - Iskandar Malaysia



**01**  
Integrated Green Transportation

Sub-actions		Measures
1	Integrated Public Transportation	Public transport system improvement
		Introduce rail based and water based public transport
		Efficient/ seamless inter-modal transfer (interchange) facilities
2	Improvement of JB - Singapore, JB-KL Connectivity	Intercity High Speed Rail Transit (HSRT)
3	Diffusion of Low Carbon Vehicles	Promote use of low carbon vehicles
4	Enhancing Traffic Flow Conditions and Performance	Transportation Demand Management (TDM)
5	Green Transportation in Rural Areas	Improve public transport services & use in rural areas
6	Green Freight Transportation	Modal shift to greener freight transport modes
		Promote green/ hybrid freight transport



**02**  
Green Industry

Sub-actions		Measures
1	IM as Global Hub for Green Industry	Tax incentives & fiscal measures to attract green industries
		Promotion of R&D in strategic sectors
2	Decarbonising Industries	Reducing energy intensity of industrial production process
		Carbon reduction and environmental standards/ rules/ regulation
3	Green Employment in Existing Industries	Promote the ecological & economic benefits of greening existing industries
		Promotion of environmental analytical & advisory services towards improving resource & energy efficiency in existing industries
4	Human Capital Development in Green Industry	Upgrading/ retraining existing pool of professional & semi-professional workers
		Regional education hub for green industry

# LCCC participation - Iskandar Malaysia



**03**  
Low Carbon Urban Governance

Sub-actions		Measures
1	Development Planning for Low Carbon Iskandar Malaysia	Institutionalisation of low carbon vision & carbon reduction targets in all statutory plans (Johor Bahru District Local Plan and IM Comprehensive Development Plan) Design clear low carbon zoning and urban design codes that are geared towards Iskandar Malaysia's smart urban growth
2	Planning Control Process, Procedures and Mechanism for Materializing LCS in Iskandar Malaysia	Reform and streamline currently fragmented planning approval processes Enhance Substantive (Content) Aspects of Development Planning Approval
3	Development of Necessary Human Capital for Operationalising and Implementing Iskandar Malaysia's Low Carbon Society Vision	Progressive retraining of planners, architects, engineer and other built environment professional and semi-professional in state and local planning authorities
4	Iskandar Malaysia LCS Monitoring , Reporting and Publication System	Setting up of a Low Carbon Monitoring Unit in All Local Authorities in Iskandar Malaysia



**04**  
Green Building and Construction

Sub-actions		Measures
1	Promoting Green Building in New Construction	Expedite approval process for green buildings Showcase/prototype of a green building in IM
2	Energy Efficiency Improvement of Existing Buildings (Retrofitting)	Identify candidate buildings (commercial and offices) for retrofitting demonstration project
3	Green Construction	Developers to promote green design Use of recyclable and low embodied energy building materials
4	Green Building Design and Technology	Introduce Building Energy Management System (BEMS) & Industrialised Building System (IBS) Climatically responsive building design "Built to last" buildings - longer building lifespan
5	Rural Green Buildings	Conservation & promotion of vernacular, climatically adapted architecture in rural areas

# LCCC participation - Iskandar Malaysia



**05**  
Green Energy System  
and Renewable Energy



**06**  
Low Carbon Lifestyle

Sub-actions		Measures
1	Promotion of Renewable/ Alternative Energy	Harnessing solar energy
		Utilisation of energy from waste
		Hydrogen utilization
2	Establishment of Advanced Energy System	Employing of distributed energy system
		Widespread use of energy storage
		Diffusion of demand response technologies
		Incorporation of power management system (IT Technologies)
3	Provision of Incentives and Subsidies and Derivation of Tariff Rates	Incentives for green energy initiative
		Tariff for future grid

Sub-actions		Measures
1	Awareness through Education	Enhancing general public awareness
		Enhancing school children awareness
2	Smart Working Style	Work from home
		Staggered working hour
3	Promote Energy Efficiency	Promote sales and use of energy efficient appliances
		Promote energy saving practices
		Incentives for green energy initiatives
4	Promote "Smart Travel Choices"	Public information on "Smart Travel Choices"
5	Stock-taking for Low Carbon Lifestyle	Promote self management of lifestyle to monitor CO <sub>2</sub> emission and expenditure in residential and community

# LCCC participation - Iskandar Malaysia



**07**  
Community Engagement  
and Consensus Building



**08**  
Walkable, Safe, Livable City Design

Sub-actions		Measures
1	Share LCS Information and Gather Opinion through Stakeholder Engagement	Periodic LCS workshops and focus group discussion (FGD) with stakeholders in IM Ongoing feedback and comments on LCS actions
2	Public Information on LCS Progress	LCS progress through mass media Mobile LCS media center
3	Developing Model Low Carbon Communities	Choose, plan & implement LCS initiatives
4	Green Ambassadors/ Champions	Appoint individuals as neighbourhood, company, organization green ambassadors/ champions Appoint ambassadors/ champions in schools

Sub-actions		Measures
1	Designing Walkable City Centers and Neighborhoods	Providing comfortable walkways Interconnected pedestrian network
2	Designing the Cyclist-friendly City	Providing safe, comfortable, cycling network
3	Designing the Safe City (from crime)	Crime prevention through environmental design (CPTED ) Increase police presence
4	Designing Civilised & Livable Streets through Traffic Calming	Reduce vehicle speed Street environmental enhancement Reclaiming pedestrian space



# LCCC participation - Iskandar Malaysia



09  
Smart Urban Growth

Sub-actions		Measures
1	Promote Polycentric Growth Pattern in IM	Gradual urban function reconcentration in polycentric nodes connected by public transportation
2	Promote Compact Urban Development	Urban growth boundary (UGB) for Iskandar Malaysia
		Higher density mixed use development
3	Promote Transit Supportive Land Use Planning	Transit Oriented Development (TOD) & Station Area Planning (SAP)
4	Develop the 'Smart Digital City'	Information and Communication Technology (ICT)



10  
Green and Blue Infrastructure and Rural Resources

Sub-Actions		Measures
1	Regional Green Corridor Network	Acquisition of land for forest connections
		Protect existing forests
2	Conservation of Mangrove Forests	Reinforce protection of existing mangrove areas
		Mangrove area regeneration
3	Promote Urban Forests (urban recreation and green lungs)	Reintroduce endemic forest species into existing urban parks
		Create new urban parks
		Increasing green cover
		Reforestation
	Ongoing urban tree planting campaign	
4	New Development to Retain Existing Vegetation	Enforcement of ACT 172 (Part VA: Trees Preservation Order)
5	Low Carbon Farming in Rural Areas	Promotion of low carbon farming in rural areas
6	Ecotourism and Rural-cultural Tourism	Promotion of natural resource-based and rural cultural tourism

# LCCC participation - Iskandar Malaysia



11 Sustainable Waste Management

Sub-actions		Measures
1	Promote Polycentric Growth Pattern in IM	Gradual urban function reconcentration in polycentric nodes connected by public transportation
2	Promote Compact Urban Development	Urban growth boundary (UGB) for Iskandar Malaysia
		Higher density mixed use development
3	Promote Transit Supportive Land Use Planning	Transit Oriented Development (TOD) & Station Area Planning (SAP)
4	Develop the 'Smart Digital City'	Information and Communication Technology (ICT)



12 Clean Air Environment

Sub-actions		Measures
1	Clean Air Quality	Implementation of co-benefits of approach in policymaking process
		Promote win-win actions in Industry
		Promote low-emission vehicle and public transportation
		Compensate the negative impact of LCS CM on local air quality
2	Improve Regional Air Quality	Continuous monitoring & real-time publishing of Air Pollution Index (API) information
		Strengthen cross-border cooperation towards reducing perennial haze occurrences

# LCCC participation - Iskandar Malaysia



12  
Clean Air Environment

Sub-actions		Measures
1	Promote Polycentric Growth Pattern in IM	Gradual urban function reconcentration in polycentric nodes connected by public transportation
2	Promote Compact Urban Development	Urban growth boundary (UGB) for Iskandar Malaysia
		Higher density mixed use development
3	Promote Transit Supportive Land Use Planning	Transit Oriented Development (TOD) & Station Area Planning (SAP)
4	Develop the 'Smart Digital City'	Information and Communication Technology (ICT)



10  
Green and Blue Infrastructure and Rural Resources

Sub-actions		Measures
1	Sustainable Municipal Solid Waste Management	Reduction at source
		Recycling of municipal solid waste
		Extended final disposal
		Effective waste transportation
2	Sustainable Agricultural Waste Management	Biomass to wealth
3	Sustainable Industrial Waste Management	Scheduled waste reduction and treatment
		Non-scheduled waste reduction, reuse and treatment
4	Sustainable Sewage Sludge Management	Improved sewage treatment and sludge recycling
5	Sustainable Construction and Demolition Waste Management	Reuse and recycling of construction waste

**06**



**UNIVERSITIES COMMITMENT**

# Blueprint implementation document for LCCC 2030

## BLUEPRINT IMPLEMENTATION DOCUMENT

for Low Carbon Cities Framework (LCCF)

Universiti Tun Hussein Onn Malaysia  
2019 - 2030

By UTHM

STRATEGIES / ACTIONS AND STATUS  
OF IMPLEMENTATION

## SUMMARY/CONCLUSION

UTHM under its *Low Carbon Cities Challenge 2030 (zone)* has achieved and completed the following :-

- The reduction of energy consumption for UTHM was reduced by **28.29%** in the final year 2020 compared to baseline of 2019
- The reduction of water consumption for UTHM was reduced by **11.00%** in the final year 2020 compared to baseline of 2019
- The reduction of waste generation for UTHM was reduced by **14.13%** in the final year 2020 compared to baseline of 2019
- The reduction of carbon sequestration for UTHM was increased by **4.13%** in the final year 2020 compared to baseline of 2019

# Greenery and water bodies - Current Implementation



Tree planting programme among staff and students



The 40 acres of land for the Tiny Forest Project



SCO, Planeteers and JPNJ staff in Tiny Forest Project at Hutan Simpan Lenggor, Kluang (2<sup>nd</sup> Series)

# Energy - Current Implementation



Installation of solar panel



Implementation of natural lighting design in UTHM building



The automatic lighting sensors were installed at the Tunku Tun Aminah Library (L2 element)

# Waste - Current Implementation



Cage for separation at source in few areas around UTHM



UTHM recycling collection centre



UTHM composting food waste centre



## SWIDWEB COMPOSTING SITE

SWIDWEB SOLUTIONS



**Location Map**



Food waste can be sent directly to:  
**SWIDWEB COMPOSTING SITE (Office hour)**

**SWIDWEB COMPOSTING SITE Operation Hour:**  
Sunday to Thursday  
8.30 am to 1.00 pm

**Address:**  
Jalan Lestari,  
Universiti Tun Hussein Onn Malaysia,  
86400 Batu Pahat, Johor

For any inquiries, please contact:  
PM Ir. Dr. Noor Yasmin Zainun  
SWIDWEB Solutions  
013-774 4555

## UTHM RECYCLING CENTRE LOCATION MAP



**UTHM RECYCLING CENTRE**

**WAKTU OPERASI**  
Operation Hours  
**Ahad - Rabu**  
8.30 AM - 1.00 PM  
**Khamis**  
8.30 AM - 1.00 PM  
2.00 PM - 3.30 PM

**FRIENDLY REMINDER**

- USED CLOTHES - PLEASE ENSURE THAT THE USED CLOTHES ARE IN GREAT CONDITION AND SORTED ACCORDING TO ADULT AND CHILDREN SIZE AND GENDER
- PAPER - PAPER IS SORTED INTO DIFFERENT CATEGORIES SUCH AS COLOURFUL PAPER, WHITE PAPER, MIXED PAPER AND OTHERS

### ITEMS THAT CAN BE RECYCLED

- STEEL CAN R.M.O.20
- ALUMINIUM CAN R.M1.50
- BOOK & MAGAZINE R.MO.05
- CARDBOARD R.MO.10
- WHITE PAPER R.MO.05
- MIXED PAPER R.MO.05
- NEWSPAPER R.MO.10
- HARD PLASTIC R.MO.15
- MIXED PLASTIC R.MO.15
- USED COOKING OIL R.M1.00
- USED CLOTHES

## COMPOSTER OF THE MONTH

MARCH 2021

#SCOgogreen #UTHMgreencampus



*Congratulations from SCO!*  
DO YOUR PART IN SAVING THE ENVIRONMENT



PM TS. DR. AESLINA ABDUL KADIR (FKAAB/SCO)



PM TS. DR. RAFIDAH HAMDAN (FKAAB)



DR. NUR SHAYLINDA MOHD ZIN (FKAAB/SCO)

## RECYCLER OF THE MONTH

MARCH 2021

#SCOgogreen #UTHMgreencampus



*Congratulations from SCO!*  
DO YOUR PART IN SAVING THE ENVIRONMENT



DR. MIMI MAHARIAH AZWANI MOHAMMED (CENTRE FOR LANGUAGE STUDIES)



DR. GOI WAN INN (FKAAB)



PM TS. DR. AESLINA ABDUL KADIR (FKAAB/SCO)

## HARI KITAR SEMULA @ UTHM

07 April 2021 | Kampus Induk 9:00 pagi - 12:00 tengah hari

08 April 2021 | Kampus Pagoh 9:00 pagi - 12:00 tengah hari

Bahan yang boleh dikitar semula:

- Televisyen
- Mesin basuh
- Peti ais
- Bateri kereta
- Komputer Riba
- Alat pengimbas
- CPU
- Monitor
- Cakera keras
- Lain-lain E&E
- Besi buruk
- Logam premium
- Buku & Majalah
- Kotak kadkod
- Kertas putih
- Kertas campuran
- Suratkhabar
- Kotak minuman
- Plastik campur
- Plastik keras
- Polisterin
- Pakailan terpakai
- Kaca
- Minyak masak terpakai

# Mobility - Current Implementation



Free shuttle bus service at the UTHM campus



Electric vehicle used by staff in UTHM



Green U-Bicycle for rent to promote sustainability agenda at Tun Fatimah Residential College

# Performance criteria for Low Carbon Cities



Figure 3.1 Breakdown of Performance Criteria and Sub-criteria

No	Performance Criteria & Sub Criteria	Page No.
<b>Performance Criteria 1: Site Selection</b>		
UE 1-1	Development Within Defined Urban Footprint	33
UE 1-2	Infill Development	34
UE 1-3	Development within Transit Nodes and Corridors	35
UE 1-4	Brownfield and Greyfield Redevelopment	36
UE 1-5	Hill Slope Development	37
<b>Performance Criteria 2: Urban Form</b>		
UE 2-1	Mixed-Use Development	38
UE 2-2	Compact Development	39
UE 2-3	Road and Parking	40
UE 2-4	Comprehensive Pedestrian Network	41
UE 2-5	Comprehensive Cycling Network	42
UE 2-6	Urban Heat Island (UHI) Effect	43
<b>Performance Criteria 3: Urban Greenery and Environmental Quality</b>		
UE 3-1	Preserve Natural Ecology, Water Body and Biodiversity	45
UE 3-2	Green Open Space	46
UE 3-3	Number of Trees	47

Table 3.1: Performance Criteria and Sub-criteria for Urban Environment

No	Performance Criteria & Sub Criteria	Page No.
<b>Performance Criteria 10: Infrastructure Provision</b>		
UI 1-1	Land Take for Infrastructure and Utility Services	69
UI 1-2	Earthwork Management	70
UI 1-3	Urban Storm Water Management and Flood Mitigation	71
<b>Performance Criteria 11: Waste</b>		
UI 2-1	Construction Waste Management	72
UI 2-2	Industrial Waste Management	73
UI 2-3	Municipal Solid Waste (MSW) Management	75
<b>Performance Criteria 12: Energy</b>		
UI 3-1	Energy Optimisation	76
UI 3-2	Renewable Energy	77
UI 3-3	Site-Wide District Cooling System	78
<b>Performance Criteria 13: Water Management</b>		
UI 4-1	Efficient Water Management	79

Table 3.3: Performance Criteria and Sub-criteria for Urban Infrastructure

No	Performance Criteria & Sub Criteria	Page No.
<b>Performance Criteria 4: Reduction Use of Private Motorised Transport on Urban Road Network</b>		
UT 1-1	Classified Traffic Volume Urban Road Network	48
UT 1-2	Vehicle-km of Travel by Modes	50
<b>Performance Criteria 5: Increase in Public Transport</b>		
UT 2-1	Public Transport Ridership	52
UT 2-2	Public Transport System Improvement and Coverage	54
<b>Performance Criteria 6: Mode Shift from Private to Public Transport and Non-Motorised Transport</b>		
UT 3-1	Modal Share of Private, Public, and Non-Motorised Transport	56
<b>Performance Criteria 7: Use of Low Carbon Transport</b>		
UT 4-1	Use of More Fuel Efficient Vehicles for Passenger Vehicles and Green Freight Transport	58
UT 4-2	Number of Charging Stations	60
<b>Performance Criteria 8: Improvement to Level of Service of Road Links and Junctions</b>		
5-1	Performance of Road Links and Junctions	61
5-2	Average Link Speeds and Journey Speeds	63
<b>Performance Criteria 9: Utilisation of Transit-Oriented-Development (TOD) Approach</b>		
UT 6-1	New Development and Redevelopment Schemes Incorporating TOD Concept	65
UT 6-2	Walking and Cycling Facilities to Support Access and Mobility to/from Public Transit Nodes	67

Table 3.2: Performance Criteria and Sub-criteria for Urban Transportation

No	Performance Criteria & Sub Criteria	Page No.
<b>Performance Criteria 14: Sustainable Energy Management System</b>		
B 1-1	Energy Management System	81
B 1-2	Facility Management	82
<b>Performance Criteria 15: Low Carbon Buildings</b>		
B 2-1	Passive & Active Design	83
B 2-2	Operational Energy Consumption	85
B 2-3	Operational Water Consumption	87
B 2-4	Preserve Existing Building Stock by Retrofitting	88

Table 3.4: Performance Criteria and Sub-criteria for Building

**07**



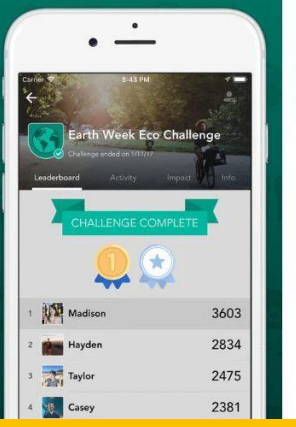
**INDIVIDUAL COMMITMENT**

# Sustainable application

Buzz whenever you do something sustainable.



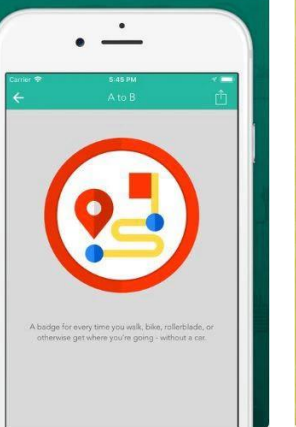
Compete in Challenges to see who's the greenest.



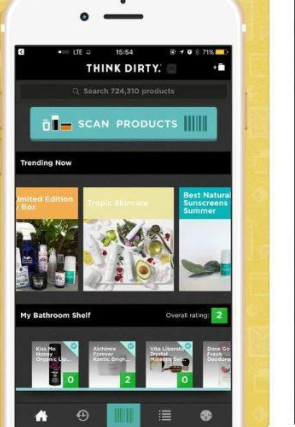
Join Communities to learn the latest on sustainability near you.



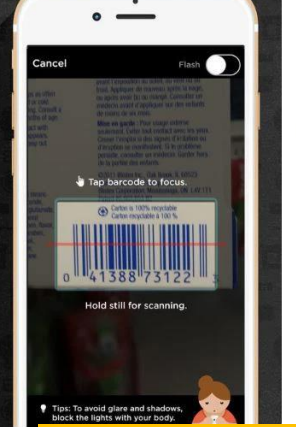
Earn Achievements for discovering new ways to go green.



Learn ingredients, compare and shop safest beauty products.



Easy to use bar-code scanner.

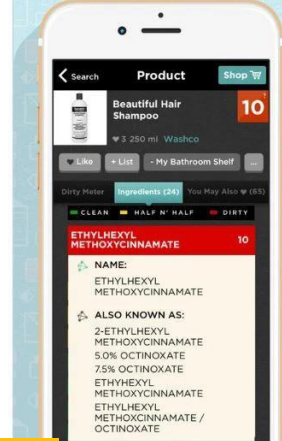


Clear Science at a Glance

Our independent rating system gives you an easy-to-understand overview of the health impacts associated with a product and its ingredients.

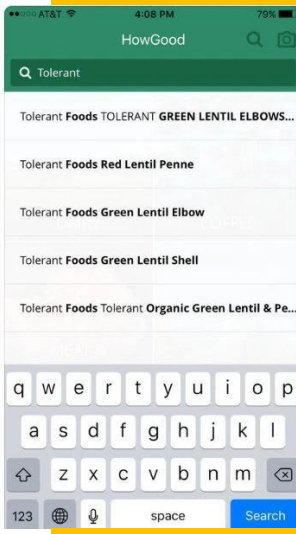
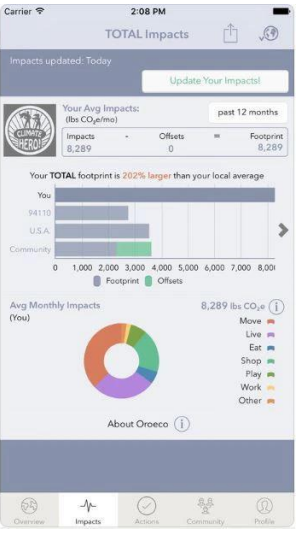
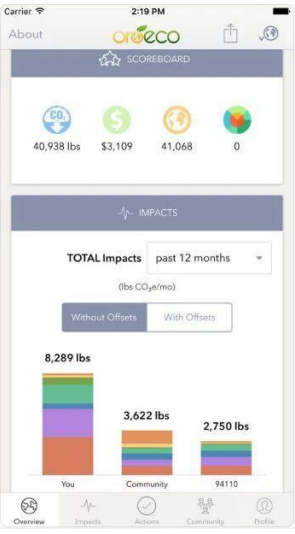
- 10 + 8** Strong and conclusive evidence show these ingredients have long-term health impacts.
- 7 + 4** Moderate and Inconclusive evidence show these ingredients have moderate health impacts.
- 3 + 0** Insufficient or no known evidence to show these ingredients are harmful ingredients.
- N/R** Products and /or Ingredients have not yet been rated.

Ingredients Easy-Peasy. Information on ingredients—including long-term effects—is in simple, easy-to-understand language.



**JouleBug Application**

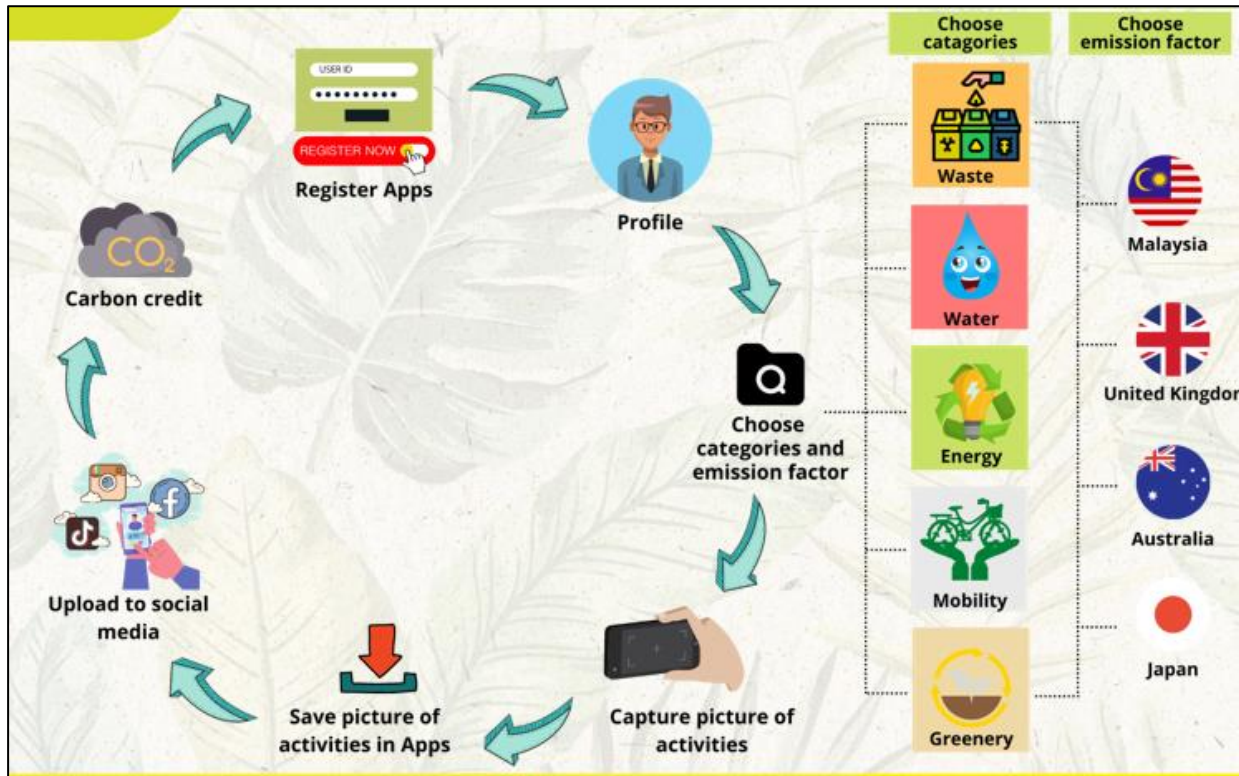
**Think Dirty Application**



**Oroeco Application**

**HowGood Application**

# Sustainable application



Apps interface

The banner is titled 'CATEGORY CHALLENGES' and is presented by the Sustainable Campus Office (SCO) at UTHM. It features five challenge categories, each with a distinct icon: WASTE (trash bins), WATER (a smiling water drop), ENERGY (a glowing lightbulb), MOBILITY (a bicycle), and GREENERY (a plant growing in a pot). The banner also includes logos for Green Meinc, PLANTERS, SCO's Recycling CENTRE, pool, SECT, and SCT. At the bottom, it provides the website [www.sco.uthm.edu.my](http://www.sco.uthm.edu.my) and the motto "Reengineering Sustainability...".

# Sustainable application



## CARBON EMISSION FACTOR ACCORDING TO COUNTRY

CARBON EMISSION	JAPAN	MALAYSIA	UNITED KINGDOM	AUSTRALIA
 <b>Waste</b>	1.114 kg CO <sub>2</sub> e/tonne (MINISTRY OF ENVIRONMENT, JAPAN)	1. Recycle = 586.531 kg CO <sub>2</sub> e/tonne (DEFRA, 2018) 2. Composting = 8.951 kg CO <sub>2</sub> e/tonne (DEFRA, 2021)	1. Organic: Food and drink waste = 626.875 kg CO <sub>2</sub> e/tonne (DEFRA, 2021) 2. Landscape waste/garden waste = 578.959 kg CO <sub>2</sub> e/tonne (DEFRA, 2021) 3. Electrical waste = 8.902 kg CO <sub>2</sub> e/tonne (DEFRA, 2021) 4. Metal = 8.902 kg CO <sub>2</sub> e/tonne (DEFRA, 2021) 5. Plastic = 8.902 kg CO <sub>2</sub> e/tonne (DEFRA, 2021) 6. Paper and board = 1401.804 kg CO <sub>2</sub> e/tonne (DEFRA, 2021)	1. Food waste = 2.1 tonne CO <sub>2</sub> /e (NGA, 2021) 2. Paper and cardboard = 3.3 tonne CO <sub>2</sub> /e (NGA, 2021) 3. Garden and green = 1.6 tonne CO <sub>2</sub> /e (NGA, 2021) 4. Inert waste (metal, plastic, glass) = 0 (NGA, 2021) 5. Rubber and leather = 3.3 tonne CO <sub>2</sub> /e (NGA, 2021)
 <b>Water</b>	0.59 kg CO <sub>2</sub> e/m <sup>3</sup> (MDPI)	0.419 kg CO <sub>2</sub> /m <sup>3</sup> (CCM Study, UNEP, 2012)	1. Water supply = 0.148 kg CO <sub>2</sub> e/m <sup>3</sup> (DEFRA, 2021)	
 <b>Energy</b>	0.506 kg CO <sub>2</sub> e/kWh (Climate Transparency)	694. CO <sub>2</sub> e/kWh (MESTECC)	1. kg CO <sub>2</sub> e per unit = 0.21233 kg CO <sub>2</sub> e/kWh (DEFRA, 2021) 2. kg CO <sub>2</sub> e of CO <sub>2</sub> per unit = 0.21016 kg CO <sub>2</sub> e/kWh (DEFRA, 2021)	
 <b>Mobility</b>	72.0 ktCO <sub>2</sub> e (IPCC, 2006)	1. Car = 0.18368 kg CO <sub>2</sub> e/km (DEFRA, 2018) 2. Motorcycle = 0.11529 kg CO <sub>2</sub> e/km (DEFRA, 2018) 3. Bus = 0.791 kg CO <sub>2</sub> e/km (LCMB, 2017)		1. Passenger car = 0.03021 kg CO <sub>2</sub> /mile (EPA, 2021) 2. Motorcycle = 0.189 kg CO <sub>2</sub> /vehicle-mile (EPA, 2021) 3. Bus = 0.056 kg CO <sub>2</sub> /passenger-mile (EPA, 2021)
 <b>Greenery</b>	21.4 Mt CO <sub>2</sub> e (WRI)	1. Forest = 14,400 kg CO <sub>2</sub> e/ha/year (NC3) 2. Landscape = 2,000 kg CO <sub>2</sub> e/ha/year (NC3) 3. Water Bodies = 2,560 kg CO <sub>2</sub> e/ha/year (NC3) 4. Trees = 30 kg CO <sub>2</sub> e/tree/year (NC3)		

# Sustainable application

**WASTE**

**WATER**

**ENERGY**

**MOBILITY**

**GREENERY**

**Direct**

**RECYCLING IN CAMPUS**

Conduct recycling activity in campus

**COMPOSTING IN CAMPUS**

Start compost in campus

**SCAVENGER HUNT**

Find recyclable items

**GO DIGITAL**

Moving away from printed documents

**GREEN GIFTBOX OR DECORATION**

Make gift boxes or decorations using waste items

**CONDUCT TRASH AUDIT**

Track what the users throw away

**STORE FOOD PROPERLY**

Store everything you buy properly so it can last longer

**ONLY BUY GROCERIES YOU NEED**

Buy in bulk if you know you will be able to eat

**CREATIVE WAYS TO REUSE ITEMS**

Making notepads from scrap paper, repurposing glass jars, relabeling envelopes and etc

**MAKE A DIY THINGS**

Make a DIY toy or accessories from reused materials.

**EXTENDS THE LIFESPAN OF ITEMS**

Repair items that can be repaired

**SELL, GIVEAWAY OR DONATE**

Reusable items to a local thrift store, charitable organization, or resell items online.

**SHOP AT SECOND-HAND STORES**

Instead of buying everything new, check out at local thrift stores to shop for clothes.

**PREPARE YOUR OWN TRASH**

To put garbage or recycling into their own trash.

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**WASTE**

**WATER**

**ENERGY**

**MOBILITY**

**GREENERY**

**Indirect**

**MEATLESS MONDAY**

Eating fewer animal products

**AVOID DISPOSABLES**

Use reusable bottles, ditch the plastic straw

**JOIN GREEN EVENT**

Join green event on waste related

**GREEN RESEARCH & INNOVATION**

Green Research & Innovation on waste related

**PACK A WASTE-FREE LUNCH**

No trash to throw away when you're done. Use reusable lunch boxes, containers and etc

**PAINT POSTER ABOUT WASTE ACTIVITY**

To raise recycling activities and support a waste-free even..

**STUDENT GREEN TEAM**

Volunteer involvement and give the commitment to implement continuously in waste activity

**TAKE A FIELD TRIP**

Visit your local landfill, recycling center so students can see firsthand what happens to waste and learn about the waste lifecycle

**PLAY A GAME ABOUT RECYCLING**

To practice recycling in a fun way along with a motivation to recycle

**READ FACTS OR WATCH VIDEOS ABOUT WASTE ACTIVITY**

To add knowledge and learn about the recycling processes. Eg: Watch the DIY ideas video

**TALK ABOUT RECYCLING WORKS**

Spread the word! Encourage others to recycle with you

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# Sustainable application

**WASTE WATER ENERGY MOBILITY GREENERY**

**Direct**

- BRUSH WITH GREATNESS**: Turning off the taps when brushing your teeth
- USE LESS WATER**: Having short showers rather than bath
- WASTE NO WATER**: Only boiling the water you need
- LESS WASTEWATER**: Avoiding flushes
- JOIN A COMMUNITY POOL**: Instead of building a private pool, join a community pool to save water waste
- CHECK LEAKS**: Check leaks to prevent waste water
- SOAK POTS AND PANS**: Avoid running the faucet while scrape pots and pans instead soak it first
- REDUCE WATER WHEN WASH DISH**: Use small amount of water to wash dish
- PLACE A BUCKET**: Store water in the bucket instead of direct running water
- USE ECO-FRIENDLY PRODUCT**: Helps to reduce water consumption by using eco-friendly product which is less harmful to the environment
- AVOID USING AUTOMATIC DISHWASHER**: Use the automatic dishwasher for full loads only
- RINSE VEGETABLE SMARTLY**: Rinse vegetables in a bowl or sink full of clean water

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**WASTE WATER ENERGY MOBILITY GREENERY**

**Direct**

















- BRUSH WITH GREATNESS**: Turning off the taps when brushing your teeth
- USE LESS WATER**: Having short showers rather than bath
- WASTE NO WATER**: Only boiling the water you need
- LESS WASTEWATER**: Avoiding flushes
- JOIN A COMMUNITY POOL**: Instead of building a private pool, join a community pool to save water waste
- CHECK LEAKS**: Check leaks to prevent waste water
- SOAK POTS AND PANS**: Avoid running the faucet while scrape pots and pans instead soak it first
- USE A BROOM**: Use broom instead of a hose to clean sidewalks and driveways
- REDUCE WATER WHEN WASH DISH**: Use small amount of water to wash dish
- PLACE A BUCKET**: Store water in the bucket instead of direct running water
- USE ECO-FRIENDLY PRODUCT**: Helps to reduce water consumption by using eco-friendly product which is less harmful to the environment
- AVOID USING AUTOMATIC DISHWASHER**: Use the automatic dishwasher for full loads only
- RINSE VEGETABLE SMARTLY**: Rinse vegetables in a bowl or sink full of clean water
- CREATE RAINWATER STORAGE**: Use rainwater to gardening or clean house
- INSTALLING WATER SAVING SHOWER HEAD**: Install water saving shower head to reduce water waste









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# Sustainable application

  
WASTE
  
WATER
  
ENERGY
  
MOBILITY
  
GREENERY

### Direct

<b>TURN OFF THE LIGHTS</b>  Turn off lights and appliances when they're not in use	<b>ENERGY CAMPAIGN</b>  Join Earth Hour campaign	<b>APPLIANCES WITH ENERGY LABELS</b>  Get an Energy Star electrical appliance	<b>SWITCH TO A LAPTOP</b>  Use laptop than desktop computer can save 90% energy	<b>SWITCH TO TASK LIGHTING</b>  A task light consume less energy than a typical overhead lighting fixture	<b>AVOID FREQUENCY-SWITCH OF AIR CONDITIONER</b>  The more frequent the switch, the higher the power consumption	<b>LIMIT YOUR PRINTING WORKS</b>  Cut the energy required to run the printer	<b>CHOOSE LED BULBS</b>  It uses 75% less electricity than incandescent bulbs
<b>KEEP YOUR FRIDGE FULL</b>  By keeping your fridge full, there's less air can leak out	<b>UNPLUG THE CHARGERS</b>  Unplug the charges when not in used	<b>INSTALL SOLAR PANELS</b>  Install solar panel to reduce direct power	<b>USE POWER STRIPS</b>  Use power strips for multiple electronic appliance	<b>CLEAN FILTER OF AIR CONDITIONER</b>  if it is not cleaned for a long time, it consumes higher power	<b>SLOW DOWN THE FAN</b>  Slowing a fan down by only 10% can result in 25%energy savings	<b>SEAL AIR LEAKS</b>  It saves between 5% and 30% energy use	<b>ELECTRIC VEHICLES</b>  Electric vehicles are built to be more environmentally friendly.









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WASTE
  
WATER
  
ENERGY
  
MOBILITY
  
GREENERY

### Indirect

<b>CLOSE THE FRIDGE DOOR</b>  Try to keep door opening time to a minimum to put less	<b>CLOTHESLINE FOR DRYING CLOTHES</b>  Reduce the usage of dryer to dry clothes by natural drying	<b>JOIN GREEN EVENT</b>  Join green event on energy related	<b>GREEN RESEARCH &amp; INNOVATION</b>  Green Research & Innovation on energy related	<b>CLOSE WINDOW COVERINGS DURING SUMMER</b>  Close window coverings during the day to block the sun's heat	<b>OPEN WINDOW SHADES DURING WINTER</b>  Open window shades during the day to allow warming sunlight	<b>LIGHTER PAINT COLOURS</b>  Painting walls in light colours allow them to reflect the existing natural light	<b>DUST OFF BULBS</b>  Dusting off bulbs can reduce total illumination by 50%
<b>CONSULT THE EXPERTS</b>  Contact the manufacturer or an energy efficiency expert for help	<b>INSTALL A PROGRAMMABLE THERMOSTAT</b>  A programmable or smart thermostat lets you set your temperature schedule	<b>KEEP PLANTS AT HOME/ROOM</b>  Plants give out water during the transpiration process, keeping the air in your room fresh and cool on a hot day					









www.sco.uthm.edu.my | Sustainable Campus Office-SCO

# Sustainable application

 **WASTE**
 **WATER**
 **ENERGY**
 **MOBILITY**
 **GREENERY**

**Direct**

<b>PLANTING GREEN</b>  Planting tree around campus	<b>INDOOR GARDEN</b>  Indoor gardens for your own food	<b>CAMPUS LANDSCAPE</b>  Mini landscape project in campus	<b>CAMPUS HERBS GARDEN</b>  Herbs garden project in campus	<b>BUILD A CAMPUS GARDEN</b>  Grow some fruits and vegetables	<b>PLANT A NATIVE PLANTS</b>  Preserve the natural ecosystem	<b>INTRODUCE NON TOXIC PRODUCTS</b>  Use natural products for plant	<b>USE BENEFICIAL INSECT TO GET RIDE OF PESTS</b>  Use beneficial insects for natural garden pest control		
<b>SAVE THE SEEDS</b>  Collect all the seed and place them at the cool or dry place	<b>HELD A COOKING COMPETITION USING VEGETABLES AND FRUIT</b>  Make an organic fruit or juice using a fruit or vegetables	<b>MAKE A SHAMPOO OR ANY PERSONAL CARE PRODUCTS</b>  Using a fruit or vegetables	<b>USE SYNTHETIC GRASS</b>  Synthetic or artificial grass resembles your lawn grass without requiring much maintenance						










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 **WASTE**
 **WATER**
 **ENERGY**
 **MOBILITY**
 **GREENERY**

**Indirect**

<b>START A GREEN TEAM</b>  Start a green team to create impactful messaging	<b>PLANETEERS UTHM</b>  Join Planeteers at UTHM	<b>JOIN GREEN EVENT</b>  Join green event on greenery related	<b>GREEN RESEARCH &amp; INNOVATION</b>  Green Research & Innovation on greenery related	<b>EXISTING A CLASS FOR GARDENING</b>  Join gardening class to learn how to garden sustainably	<b>READ BOOKS OR MAGAZINE ABOUT PLANTING OR GREENERY</b>  To gain knowledge in planting	<b>MAKE A COMPETITION FOR A NATURE PHOTOGRAPHY</b>  The best photo will get certificates and gifts	<b>EXPLORE OTHER UNIVERSITY CAMPUS</b>  For an inspiration to design the garden
<b>SPECIAL CAMPAIGN FOR STUDENTS</b>  Implement campaign such as tree planting program in campus	<b>SELLING A PLANT</b>  Sell the plants with an affordable price	<b>EXISTING A PODCAST</b>  Can educate themselves through sustainability books that was create by students.	<b>EXISTING PLANTING COURSES IN EXTRACURRICULAR</b>  Attract students to learn more about planting	<b>MAKE A COMPETITION FOR DIY IDEAS</b>  DIY Ideas competition			










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# Carbon calculator website

climatecare  
CARBON CALCULATOR

Basket Total: 1.86 tCO<sub>2</sub>e

9 | Waste

**WASTE**  
Calculate and offset emissions from waste here:

Waste Type: Food Waste  
Amount: 1000 Kilogram  
Disposal: Landfil

**CARBON EMISSIONS**  
0.68 tonnes of CO<sub>2</sub>e

ADD TO BASKET

ICROA International Carbon Reduction & Offset Alliance +44 (0) 1865 591 000 business@climatecare.org Terms & Conditions Methodology CARBON ANALYTICS

climatecare  
CARBON CALCULATOR

CHOOSE CARBON REDUCTION PROJECTS

**CLIMATE+CARE PORTFOLIO**  
Our Climate+Care mixed portfolio is specially selected to provide a mix of the highest-quality Emission Reductions from some of our favourite projects and including a range of methodologies, whilst also delivering the most sustainable development impact – and all at an affordable price per tonne.

\$ 11.63 per tCO<sub>2</sub>e

SELECT THESE PROJECTS

BACK

ICROA International Carbon Reduction & Offset Alliance +44 (0) 1865 591 000 business@climatecare.org Terms & Conditions Methodology CARBON ANALYTICS

climatecare  
CARBON CALCULATOR

**BASKET**

Carbon offset type	Tonnes CO <sub>2</sub> e
Waste 1000 kg of food waste disposed as landfil	0.68

Total CO<sub>2</sub>e tonnes 0.68

Portfolio	Price	Tonnes	Cost
Emissions offset through Climate+Care programmes – cutting carbon and improving lives across the developing world	\$11.63	0.68	\$7.91

Voucher

BACK PROCEED

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climatecare  
CARBON CALCULATOR

Cost	Price	Tonnes	Cost
Emissions offset through Climate+Care programmes – cutting carbon and improving lives across the developing world	\$11.63	0.68	\$7.91

**Customer Details**

Name: Customer name  
Organization: Organization name  
Email: Customer email


Choose payment method  
BACK CREDIT CARD

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<https://www.climatecare.org/calculator/>

# Carbon calculator website

Welcome [House](#) [Flights](#) [Car](#) [Motorbike](#) [Bus & Rail](#) [Secondary](#) [Results](#)

 **Welcome to the web's leading carbon footprint calculator**

First, please tell us where you live: [why?](#)


Country:  miles  
State:

Carbon footprint calculations are typically based on annual emissions from the previous 12 months  
Enter the period this calculation covers (optional):  
from  to

Next, select the appropriate tab above to calculate the part of your lifestyle you are most interested in, e.g. your flights.  
Or, visit each of the tabs above to calculate your full carbon footprint.

Following your calculation, you can offset / neutralise your emissions through one of our climate-friendly projects.


Welcome [House](#) [Flights](#) [Car](#) [Motorbike](#) [Bus & Rail](#) [Secondary](#) [Results](#)

 **Car carbon footprint calculator**  
You can enter details for up to 2 cars

Mileage:  miles  
Choose vehicle:   
  
  
  
Or enter efficiency:  mpg (US)

**Total Car Footprint = 0.00 metric tons of CO<sub>2</sub>e**


Welcome [House](#) [Flights](#) [Car](#) [Motorbike](#) [Bus & Rail](#) [Secondary](#) [Results](#)

 **Public transport carbon footprint calculator**  
Enter mileage for each type of public transport, and press the Calculate button

Bus:  miles  
Coach:  miles  
Local or Commuter Train:  miles  
Long Distance Train:  miles  
Tram:  miles  
Subway:  miles  
Taxi:  miles

**Total Bus & Rail Footprint = 0.00 metric tons of CO<sub>2</sub>e**

Welcome [House](#) [Flights](#) [Car](#) [Motorbike](#) [Bus & Rail](#) [Secondary](#) [Results](#)


 **Household carbon footprint calculator**  
Enter your consumption of each type of energy, and press the Calculate button

Your individual footprint is calculated by dividing the amount of energy by the number of people in your house.  
How many people are in your household?   
To calculate your full household footprint, select "1".

Electricity:  kWh at a factor of  kgCO<sub>2</sub>e/kWh [what's this?](#)  
Natural gas:  kWh  
Heating oil:  US gallons  
Coal:  kWh  
LPG:  therms  
Propane:  US gallons  
Wooden pellets:  metric tons

**Total House Footprint = 0.00 metric tons of CO<sub>2</sub>e**

Welcome [House](#) [Flights](#) [Car](#) [Motorbike](#) [Bus & Rail](#) [Secondary](#) [Results](#)

 **Motorbike carbon footprint calculator**  
You can enter details for up to 2 motorbikes

Mileage:  miles  
  
Or enter efficiency:  mpg (US)

**Total Motorbike Footprint = 0.00 metric tons of CO<sub>2</sub>e**

Welcome [House](#) [Flights](#) [Car](#) [Motorbike](#) [Bus & Rail](#) [Secondary](#) [Results](#)

**Your Carbon Footprint:**



- House 0.00 metric tons of CO<sub>2</sub>e
- Flights 0.00 metric tons of CO<sub>2</sub>e
- Car 0.00 metric tons of CO<sub>2</sub>e
- Motorbike 0.00 metric tons of CO<sub>2</sub>e
- Bus & Rail 0.00 metric tons of CO<sub>2</sub>e
- Secondary 0.00 metric tons of CO<sub>2</sub>e

**Total = 0.00 metric tons of CO<sub>2</sub>e**

To offset some or all of your carbon footprint, click the sections you would like to offset in the list above, and click the Offset Now button.

**Total To Offset = 0.00 metric tons of CO<sub>2</sub>e**

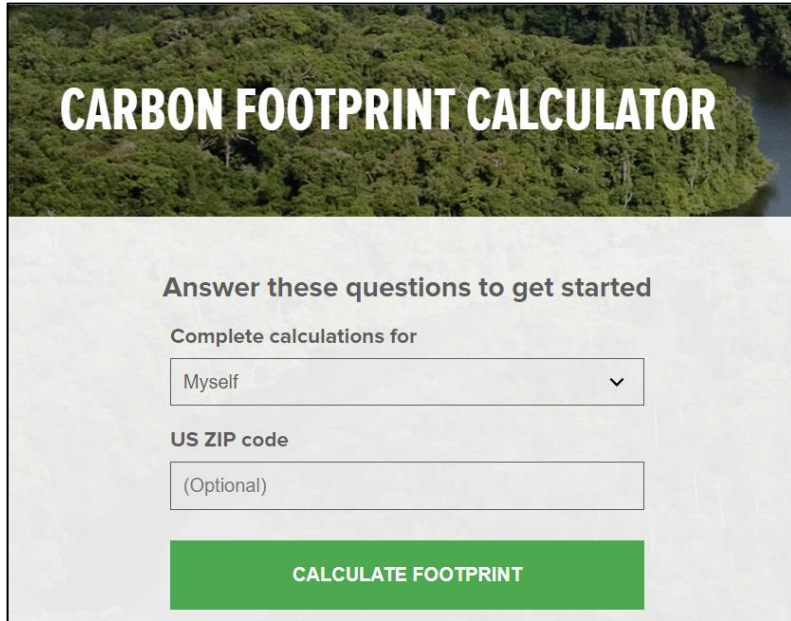


Your Footprint: ?  
Country Average:   
World Average: 

- Your footprint is 0.00 metric tons per year
- The average footprint for people in United States is 16.49 metric tons
- The average for the European Union is about 5.4 metric tons
- The average worldwide carbon footprint is about 4.8 metric tons
- The worldwide target to combat climate change is 0 metric tons

If you're using a public computer, or want to try again, you can [clear your carbon footprint data](#).  
For ideas on how to reduce your carbon footprint, see the [CO<sub>2</sub> Reduction](#) section of our website.

# Carbon calculator website



**CARBON FOOTPRINT CALCULATOR**

Answer these questions to get started

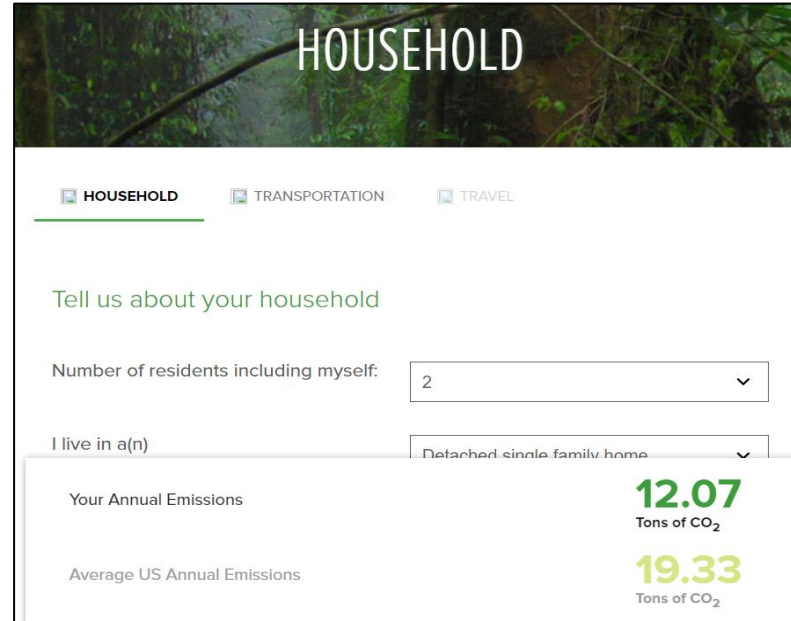
Complete calculations for

Myself

US ZIP code

(Optional)

**CALCULATE FOOTPRINT**



**HOUSEHOLD**

HOUSEHOLD TRANSPORTATION TRAVEL

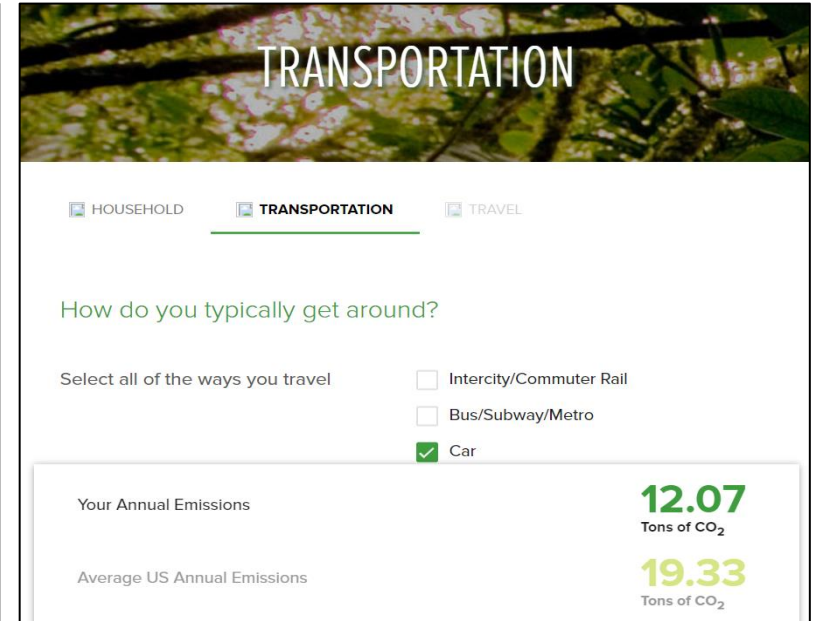
Tell us about your household

Number of residents including myself: 2

I live in a(n) Detached single family home

Your Annual Emissions **12.07**  
Tons of CO<sub>2</sub>

Average US Annual Emissions **19.33**  
Tons of CO<sub>2</sub>



**TRANSPORTATION**

HOUSEHOLD TRANSPORTATION TRAVEL

How do you typically get around?

Select all of the ways you travel

Intercity/Commuter Rail

Bus/Subway/Metro

Car

Your Annual Emissions **12.07**  
Tons of CO<sub>2</sub>

Average US Annual Emissions **19.33**  
Tons of CO<sub>2</sub>

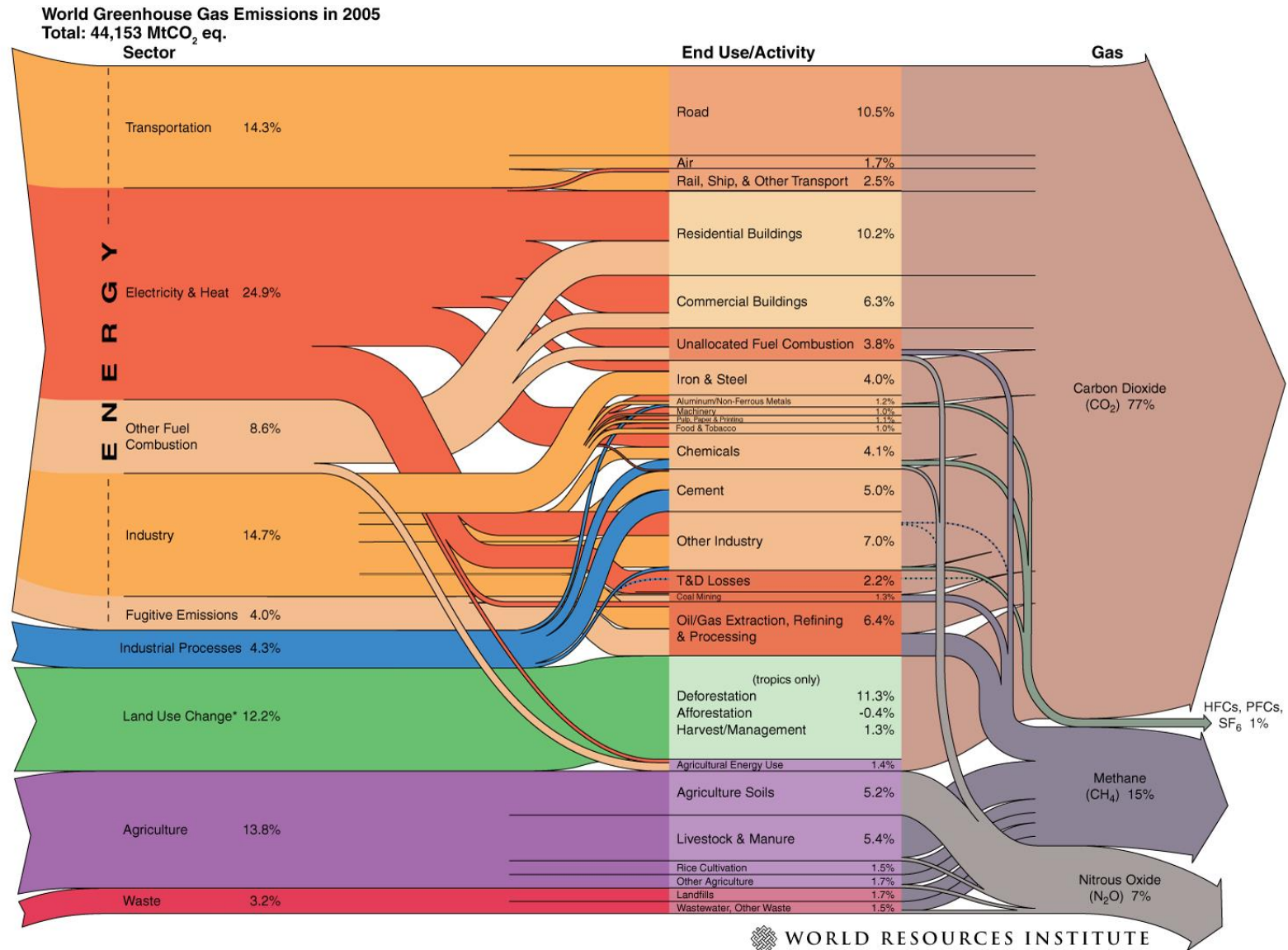
<https://www.conservation.org/carbon-footprint-calculator#/>

08



MYRESEARCH

# World GHG emission in 2005



<https://www.wri.org/data/world-greenhouse-gas-emissions-2005>



# Wasteful impact on climate change

Solid waste contributes directly to greenhouse gas emissions that give high global warming potential through:

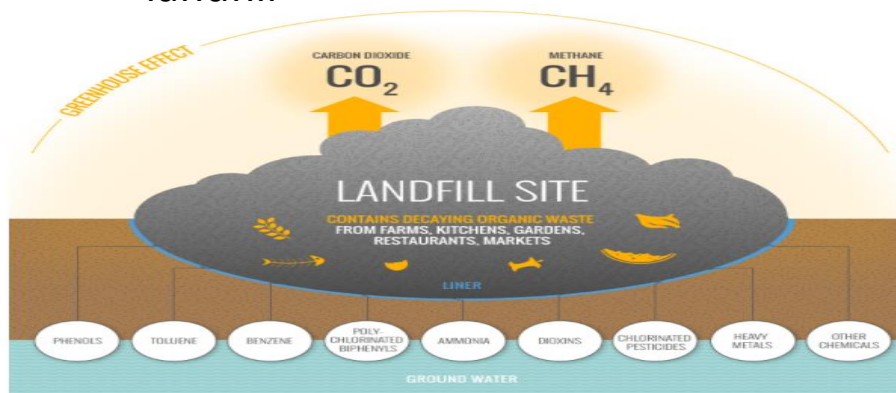
## 1. The generation of methane from the anaerobic decay of waste in landfills



Methane has **21 times** the warming potential of carbon dioxide



**90.9%** of methane emissions in Malaysia were generated from landfill



## 2. The emission of nitrous oxide from our solid waste combustion facilities



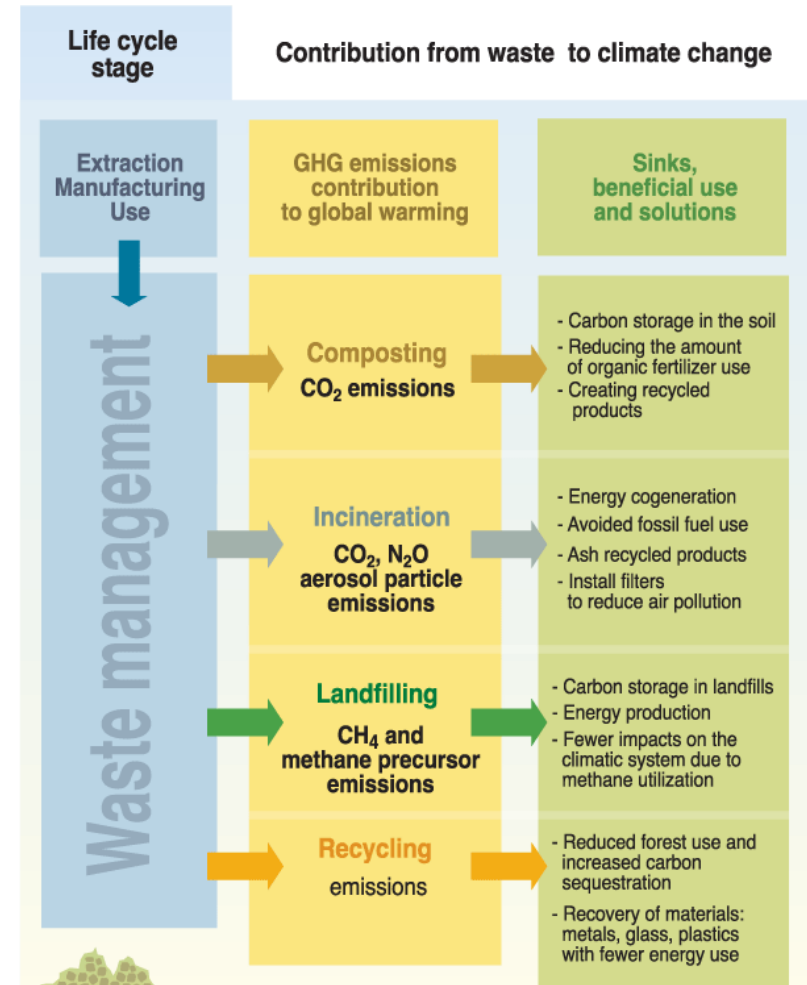
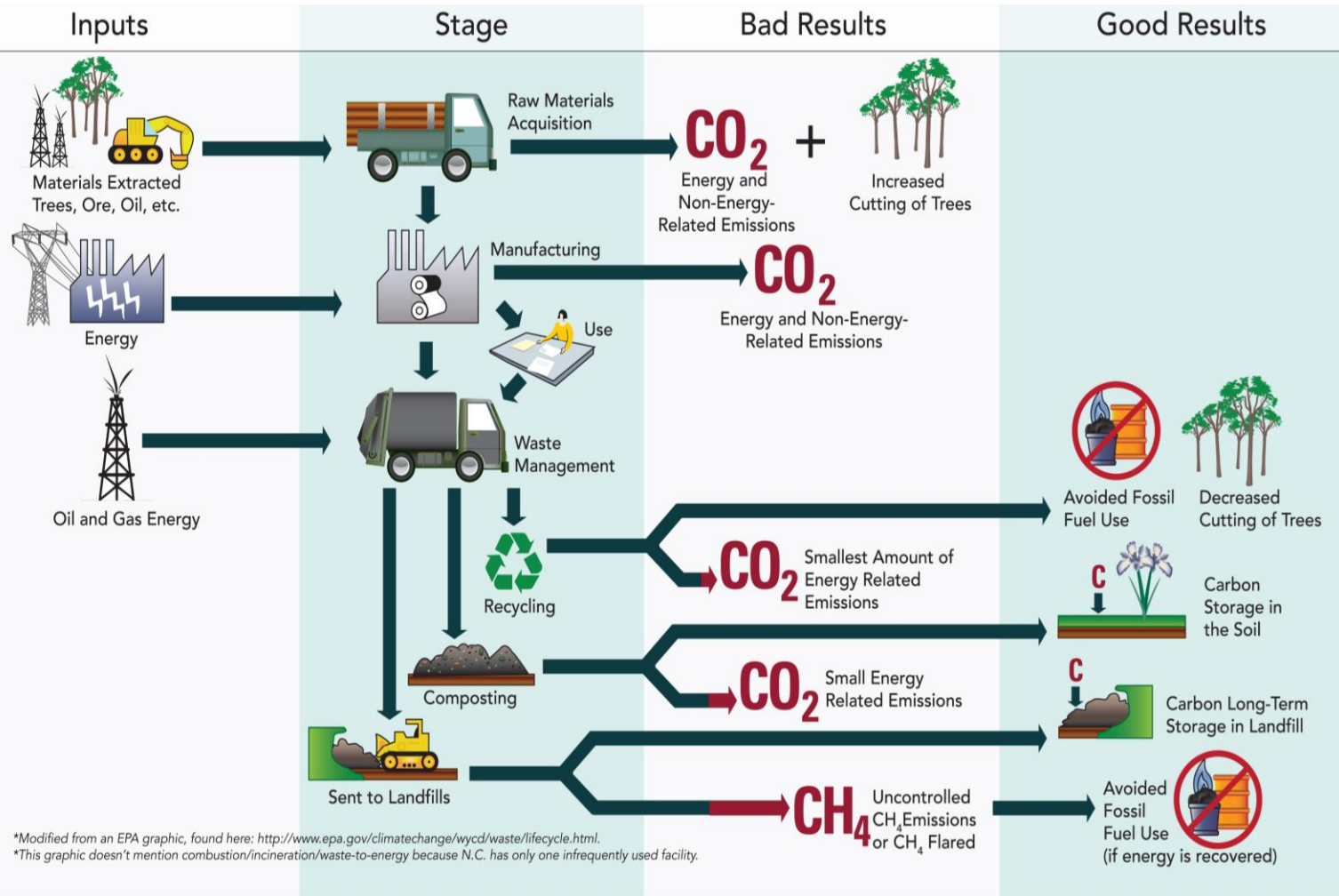
Nitrous oxide has **310 times** worse than CO<sub>2</sub> in terms of global warming



Last over **100 years** in the atmosphere



# Waste and its link to GHG emissions



<https://deq.nc.gov/conservation/recycling/recycling-climate-change>

<https://kingcounty.gov/depts/dnrp/solid-waste/programs/climate/climate-change-waste-management.aspx>

# Recycling and climate change

Reducing waste, recycling and composting are effective ways to decrease the generation of greenhouse gases such as carbon dioxide and methane. They achieve these benefits in two ways

1. by helping save energy in the processing of materials for industrial and consumer use, and
2. by reducing the flow of materials

Especially food and other organic wastes into landfills where anaerobic decomposition produces methane.

*Did you know?*

## RECYCLING SAVES ENERGY

EVERY TIME A NEW PRODUCT IS MADE FROM RAW MATERIALS, LARGE AMOUNTS OF ENERGY ARE CONSUMED. RECYCLING PRODUCTS DECREASES THE AMOUNT OF ENERGY IT TAKES TO PRODUCE THESE ITEMS.

**WHY SHOULD WE CARE?**

Recycling uses LESS energy → so FEWER fossil fuels are burned → which REDUCES carbon dioxide in the atmosphere → and DECREASES greenhouse gases → which DECREASES global warming.

**95%**  
Using recycled scraps to make aluminum cans uses 95 percent less energy than making cans from raw materials.

**75%**  
It takes 75 percent less energy to make recycled steel than steel produced from raw materials.

**4** ENERGY IS USED IN THE STAGES OF PRODUCT DEVELOPMENT:  
EXTRACTION OF RAW MATERIALS  
MANUFACTURE OF RAW MATERIALS INTO PRODUCTS  
PRODUCT USE BY CONSUMERS  
PRODUCT DISPOSAL

Energy plays a role in all 4 stages! Knock out one of these steps by recycling and you've saved energy.

**RECYCLEMORE**

For more recycling and energy-saving information, visit [www.recyclemorenc.org](http://www.recyclemorenc.org).

<https://deq.nc.gov/conservation/recycling/recycling-climate-change>

# Composting and climate change

## HOW DOES COMPOSTING HELP THE ENVIRONMENT?



### GREENHOUSE GASES TRAP HEAT IN THE ATMOSPHERE

Greenhouse gases can contribute to the depletion of the protective ozone layer and cause climate change.

### HUMAN ACTIVITY HAS INCREASED GREENHOUSE GAS EMISSIONS OF:

- carbon dioxide (CO<sub>2</sub>)
- methane (CH<sub>4</sub>)
- nitrous oxide (N<sub>2</sub>O)
- fluorinated gases

*The best way we can help decrease methane emissions is to compost!*

### COMPOSTING DECREASES THE GREENHOUSE GAS, METHANE



composting produces nutrient-rich fertilizer

Composting = recycling organic, decomposable, biodegradable waste into nutrient-rich fertilizer for our crops.

- + aerobic nature of composting produces very little methane
- + composting decreases the amount of trash that goes into landfills
- + composting decreases methane emissions

**Methane** is a greenhouse gas that is, over the course of 20 years, **72 times more potent than CO<sub>2</sub>**

*What are some everyday items that can be composted?*

- + Vegetable, fruit scraps
- + Leaves, grass
- + Shredded paper
- + Paper towels
- + Eggshells
- + Coffee grounds, filters
- + Bread, grains, pasta
- + Tea bags

### LANDFILLS ARE THE LARGEST HUMAN-MADE CONTRIBUTOR OF METHANE INTO THE ATMOSPHERE



When organic waste is disposed of in the trash, instead of composted, it ends up in a landfill. As the landfill is filled and covered, no air can pass through, causing anaerobic conditions. In these conditions, the decomposition of organic waste produces methane within the landfill that needs to be released.

*aerobic = air  
anaerobic = no air*

For more composting and environmental information, visit [www.recyclenorenc.org](http://www.recyclenorenc.org).



<https://deq.nc.gov/conservation/recycling/recycling-climate-change>

# MYRESEARCH – Cigarette butt brick



- CBs that are flicked away by smokers on the streets, footpaths, nature strips and gutters contain a significant amount of nicotine trapped in the fibres of the filter
- The cellulose acetate filters in CBs are slow to biodegrade and the toxic chemicals that trapped inside the body as they deteriorate pose a serious environmental risk

# MYRESEARCH – Mosaic sludge brick



- Sludge can also be produced by industrial waste, hospital waste, wastewater, treatment plant, runoff from the street, farmland and in some cases from landfill leachate
- Sludge can be either organic and inorganic due to the wastewater treatment activity
- Mosaic sludge on this study will be divided by two : **Polishing sludge (PS)** and **Bodymill sludge (BS)**
- The mosaic sludge was collected in **semisolid condition**

# MYRESEARCH – Palm oil mill waste brick



- Thousand tons of palm oil waste during oil palm extraction are produced annually and eventually disposed into landfill
- Different types of palm oil mill waste such as : **Empty Fruit Bunch, Palm Fibre, Palm Kernel Shell and Palm Oil Fuel Ash**

# MYRESEARCH – Electroplating sludge brick



- Electroplating is the chemical process involves the deposition of metal ion into the surface of material with low-voltage direct current
- Applications: 1) Provide protective coating to prevent corrosion 2) Improve strength and appearance of the material
- In Malaysia, electroplating has dominated nearly 51.6% shares from metal finishing chemicals market in 2017 and predicted to contribute about USD 46.41 million by 2025 (Research and Market, 2018)

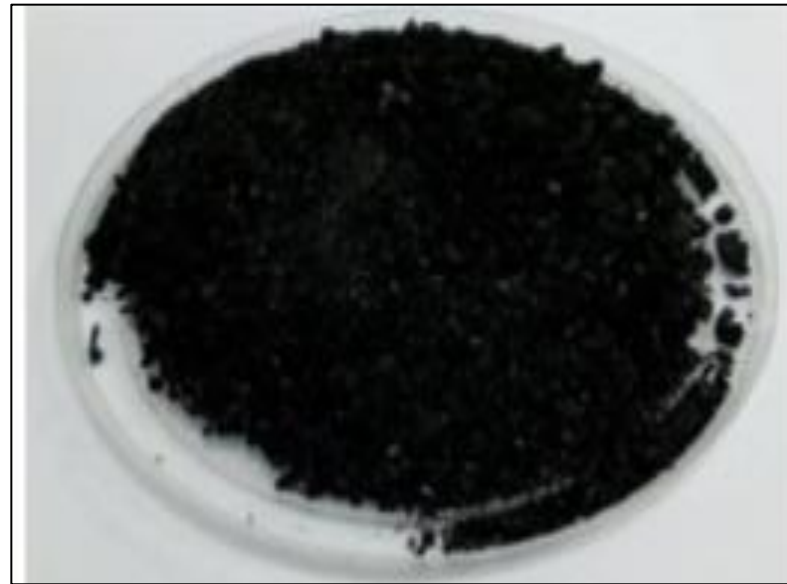


# MYRESEARCH – Self-compact concrete



- Malaysia could not escape from facing the solid waste management problems
- Economic growth has contributed to the increase in the demand for electricity primarily that was produced by coal-fired plant
- It will lead to the increment in coal by the power plants thus will generate waste such as **fly ash (FA)** and **bottom ash (BA)** to landfills
- These wastes must properly manage and disposed of without causing any harmful environmental effects

# MYRESEARCH – Petroleum sludge/palm oil fuel ash/quarry dust concrete



- Petroleum has become the world's important source of energy due to its high energy density, easy transportability and relative abundance
- Investigation of the long-term leaching of heavy metals from petroleum sludge by using S/S matrices incorporated with palm oil fuel ash as replacement of cement and quarry dust as replacement of sand respectively
- Two types of leaching method are used to give the result on composition of heavy metals from S/S matrices and effect from the long-term leaching of heavy metals by using Semi-Dynamic Leaching Procedure (SDLP) and Static Leaching Test (SLT)

# MYRESEARCH – The performance of Takakura composting using food waste from Makanan Ringan Mas industry



(a)



(b)



# Community program



The handover of composting materials to 10 selected schools in Simpang Renggam Parliament



Takakura home composting technique



Composting and Recycling Demonstration

# THANK YOU!

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