AMBASSADORS OF SUSTAINABILITY

CLIMATE CHANGE AND PEACE

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WHERE I COME FROM

UTHM
Universiti Tun Hussein Onn Malaysia
Technically Above The Rest

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)

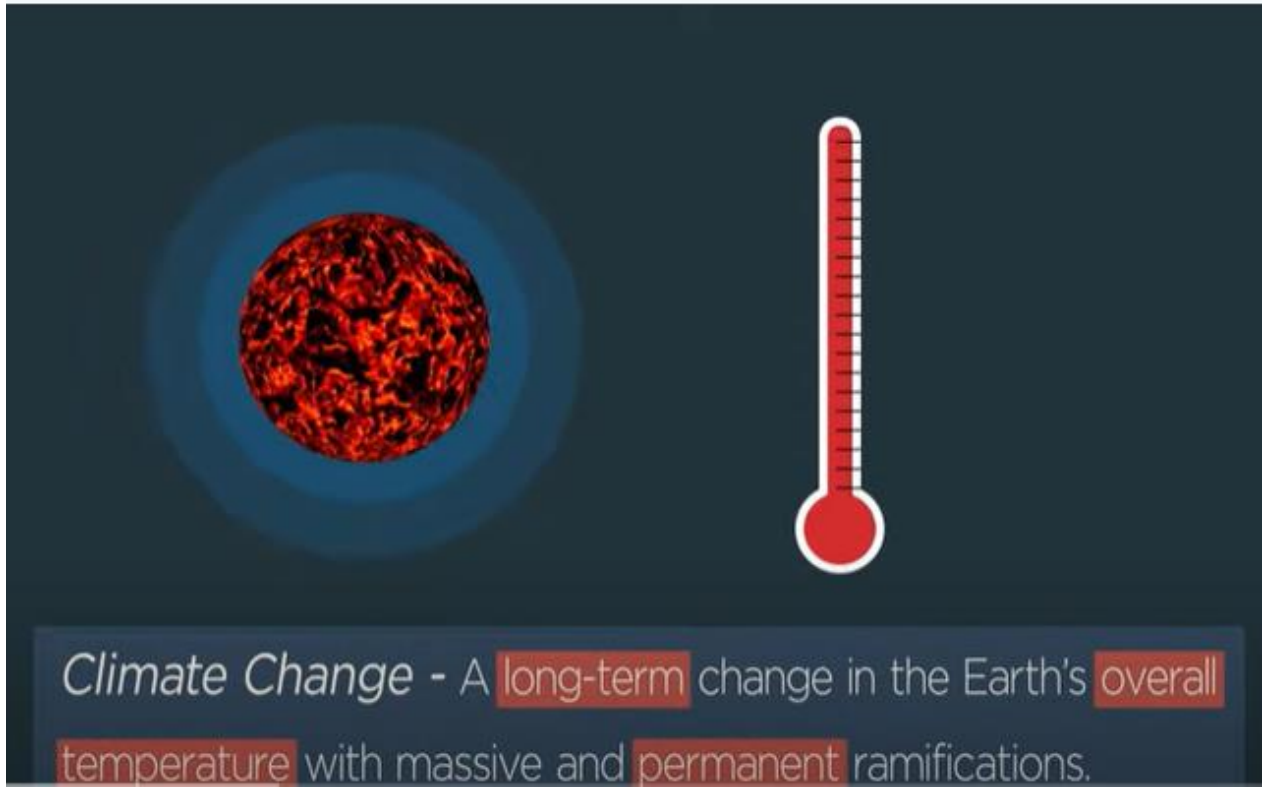
WHERE I COME FROM

Topics On Climate Change And Peace

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

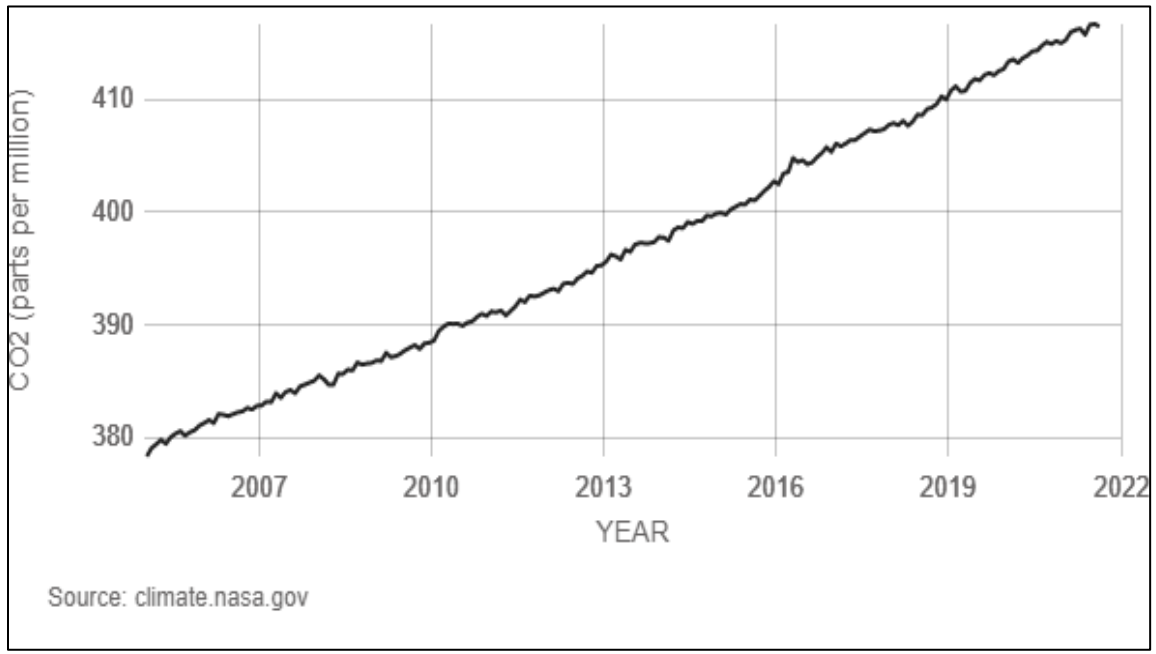
Carbon Dioxide (CO_2) levels	**Ice Sheets**
Global Temperature	**Sea Level**
Arctic Sea Ice Minimum	**Ocean Heat Content**

-Carbon Dioxide (CO_2) levels-

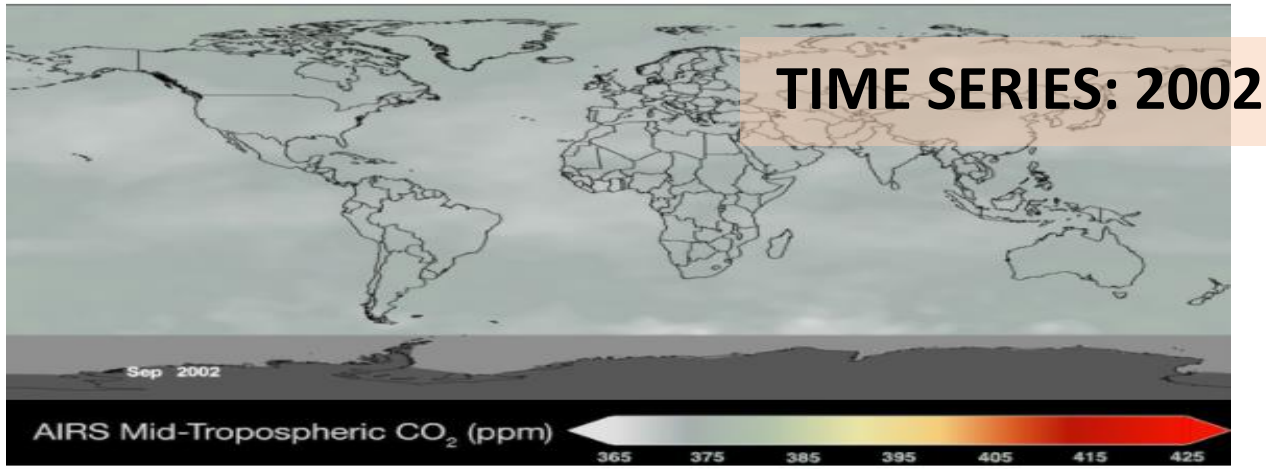
Latest measurement: August 2021

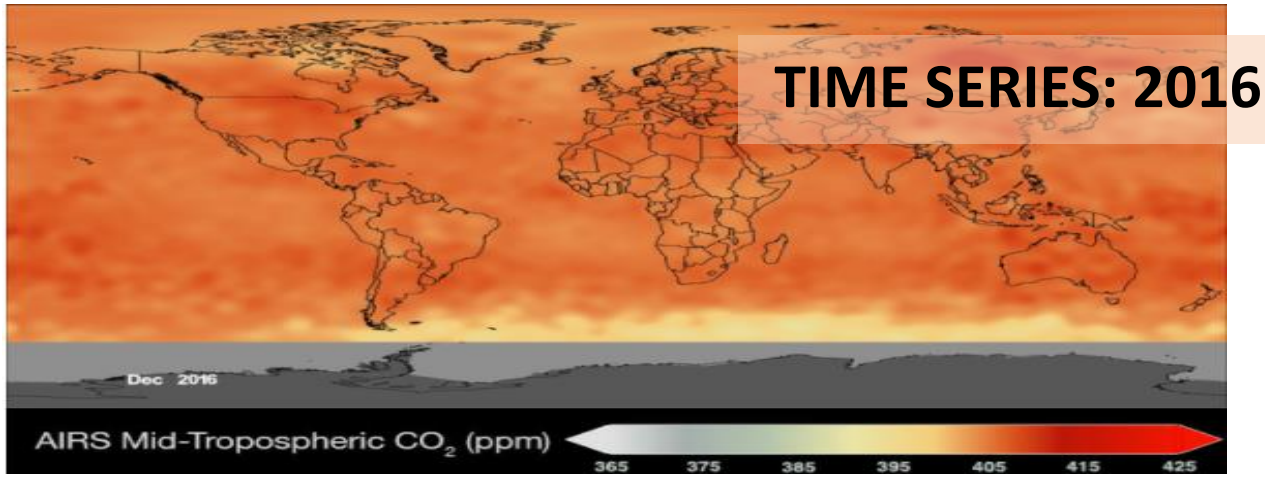
416 ppm

- Human activities have profoundly increased CO_2 (a heat-trapping gas) levels in Earth's atmosphere.



DIRECT MEASUREMENTS: 2005-PRESENT





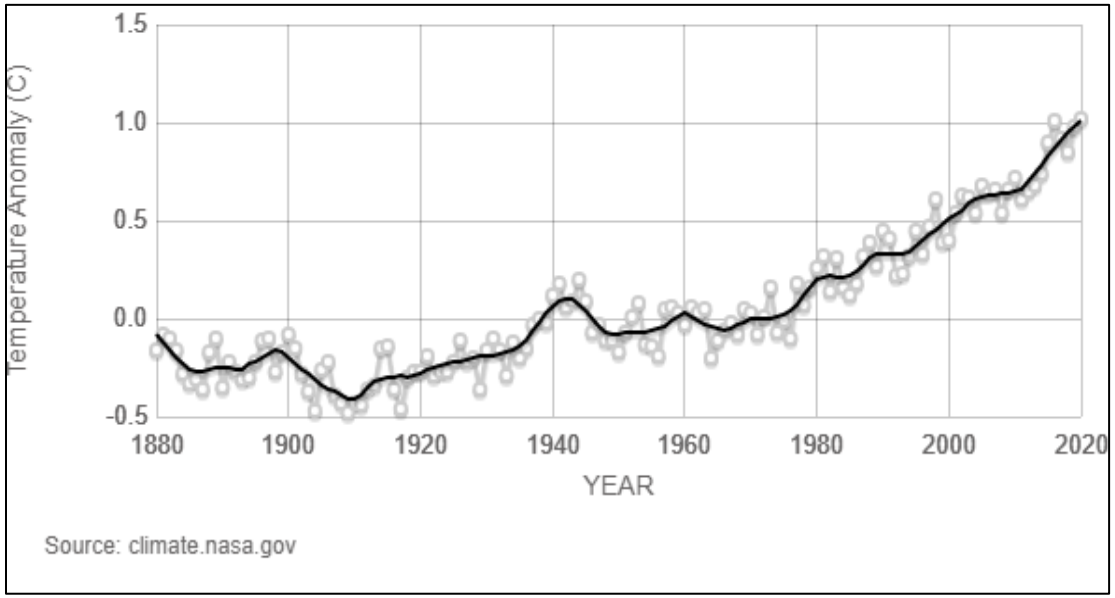
Global distribution and variation of the concentration of mid-tropospheric carbon dioxide in parts per million (ppm)

-Global Temperature-

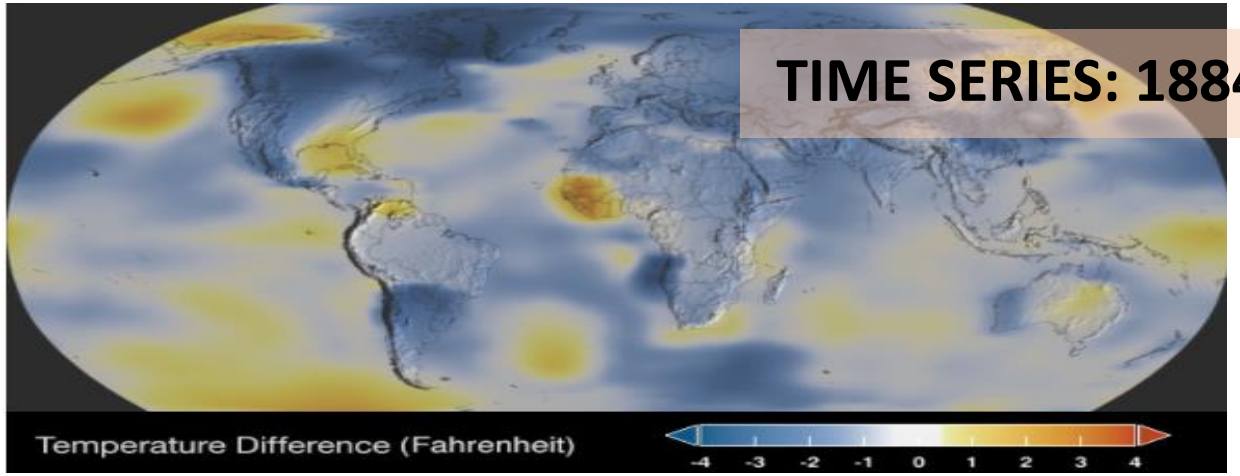
LATEST ANNUAL AVERAGE ANOMALY: 2020

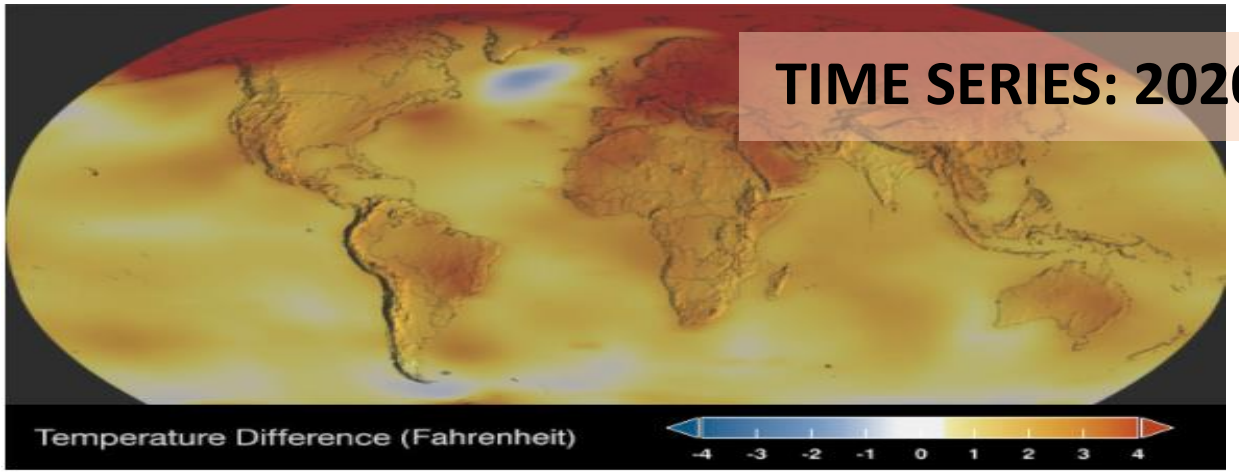
1.02°C | 1.84°F

- 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





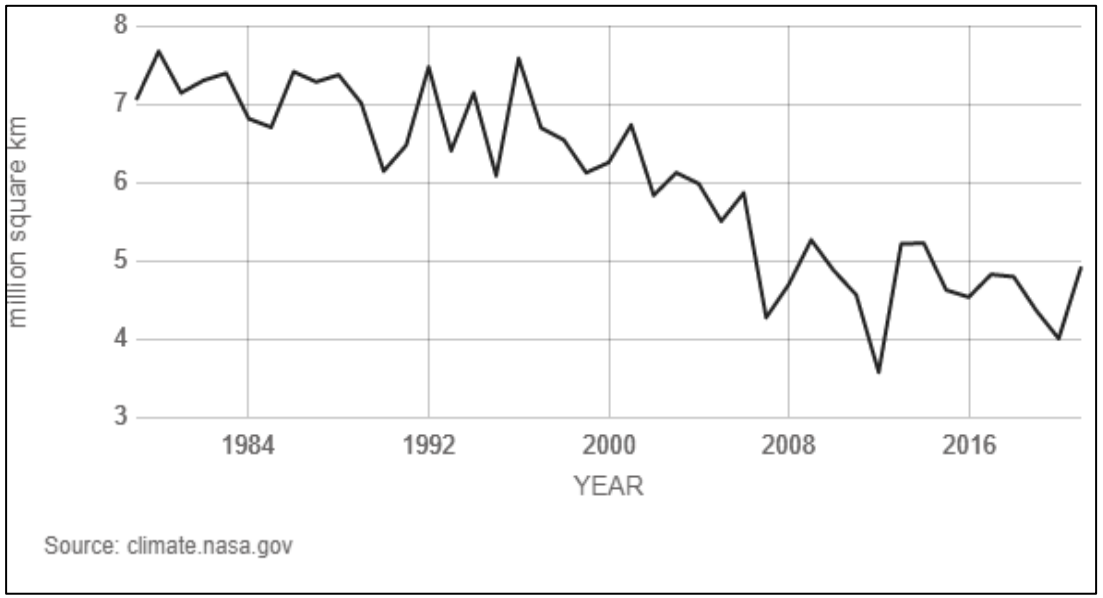
Change in global surface temperature

-Arctic Sea Ice Minimum-

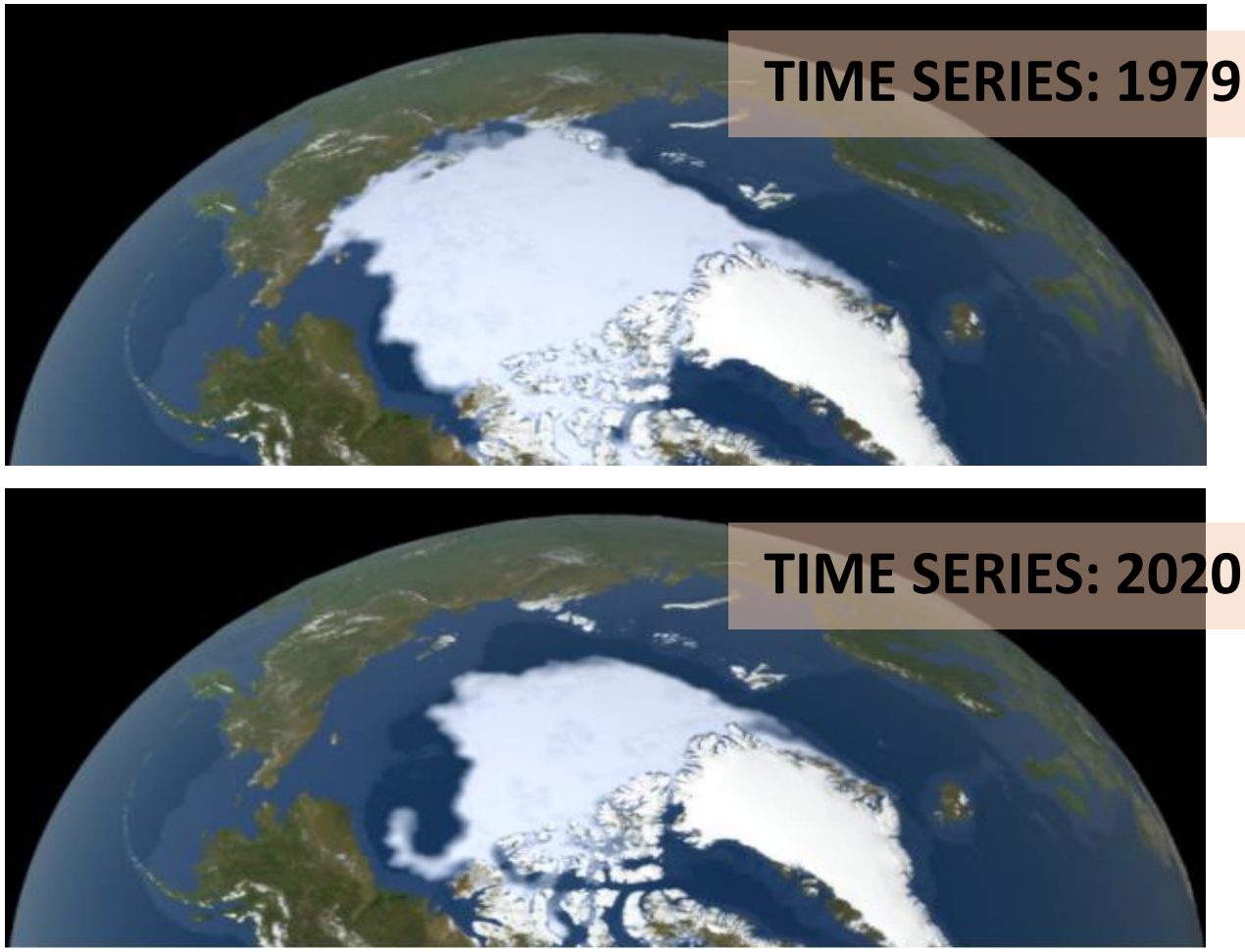
RATE OF CHANGE

↓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



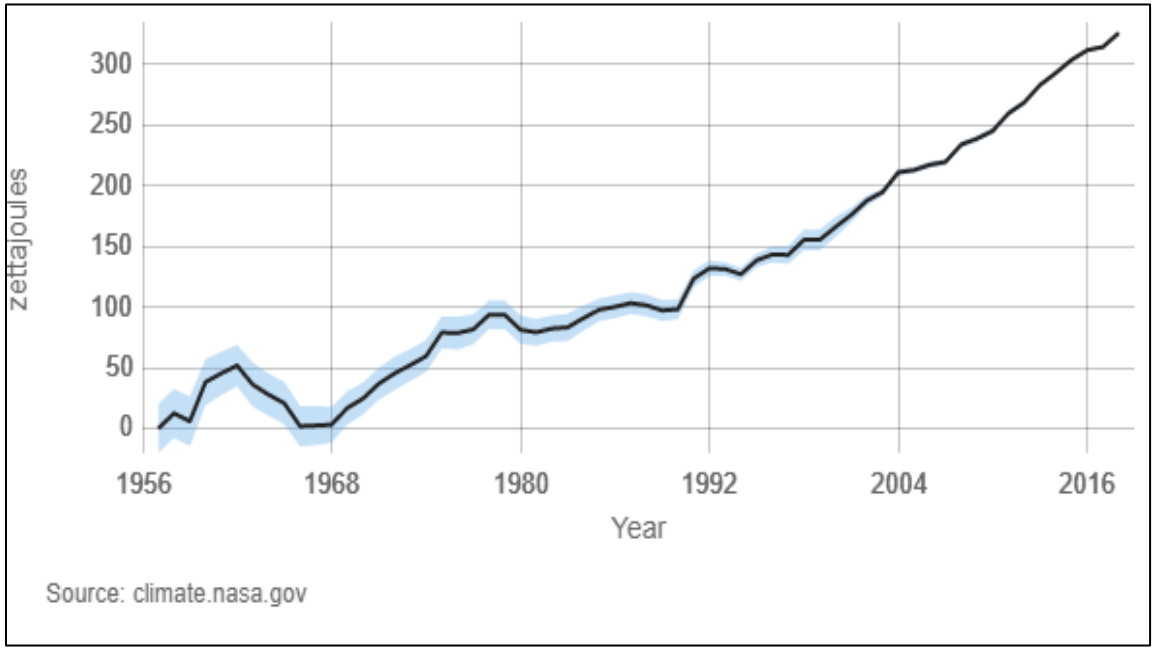
Annual Arctic sea ice minimum since 1979, based on satellite observations

-Ocean Heat Content-

LATEST MEASUREMENT: December 2020

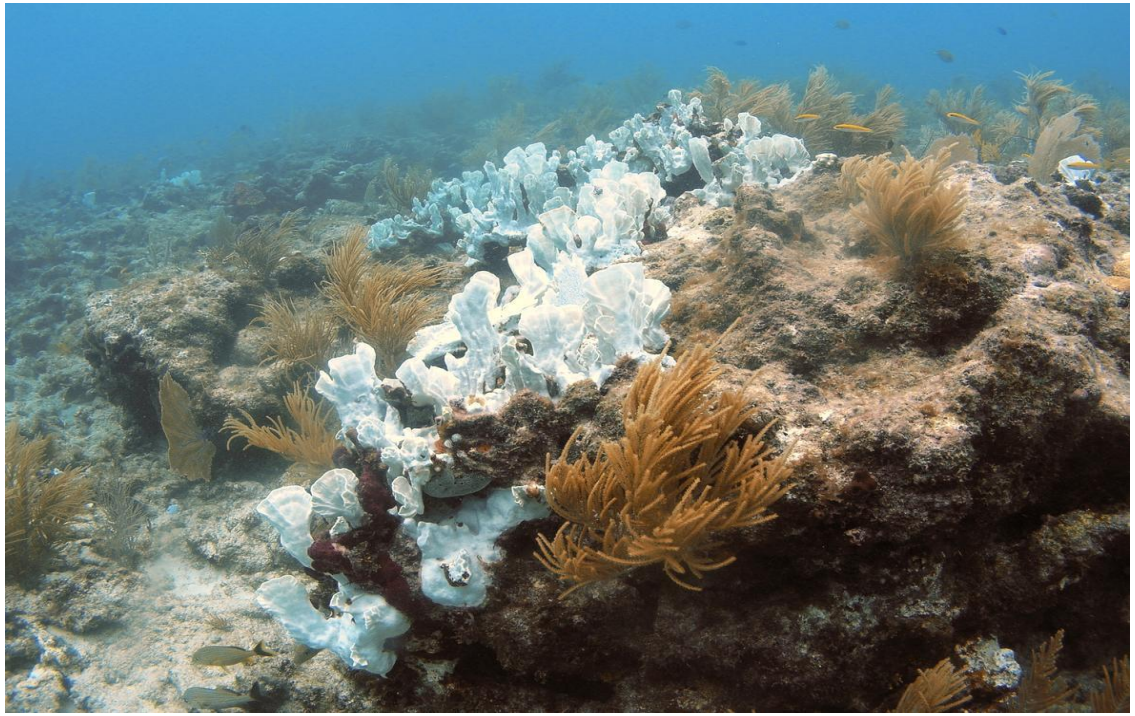
326 (±2) zettajoules

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_2): Fossil fuel use is the primary source of CO_2. CO_2 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_2 from the atmosphere through reforestation, improvement of soils, and other activities.

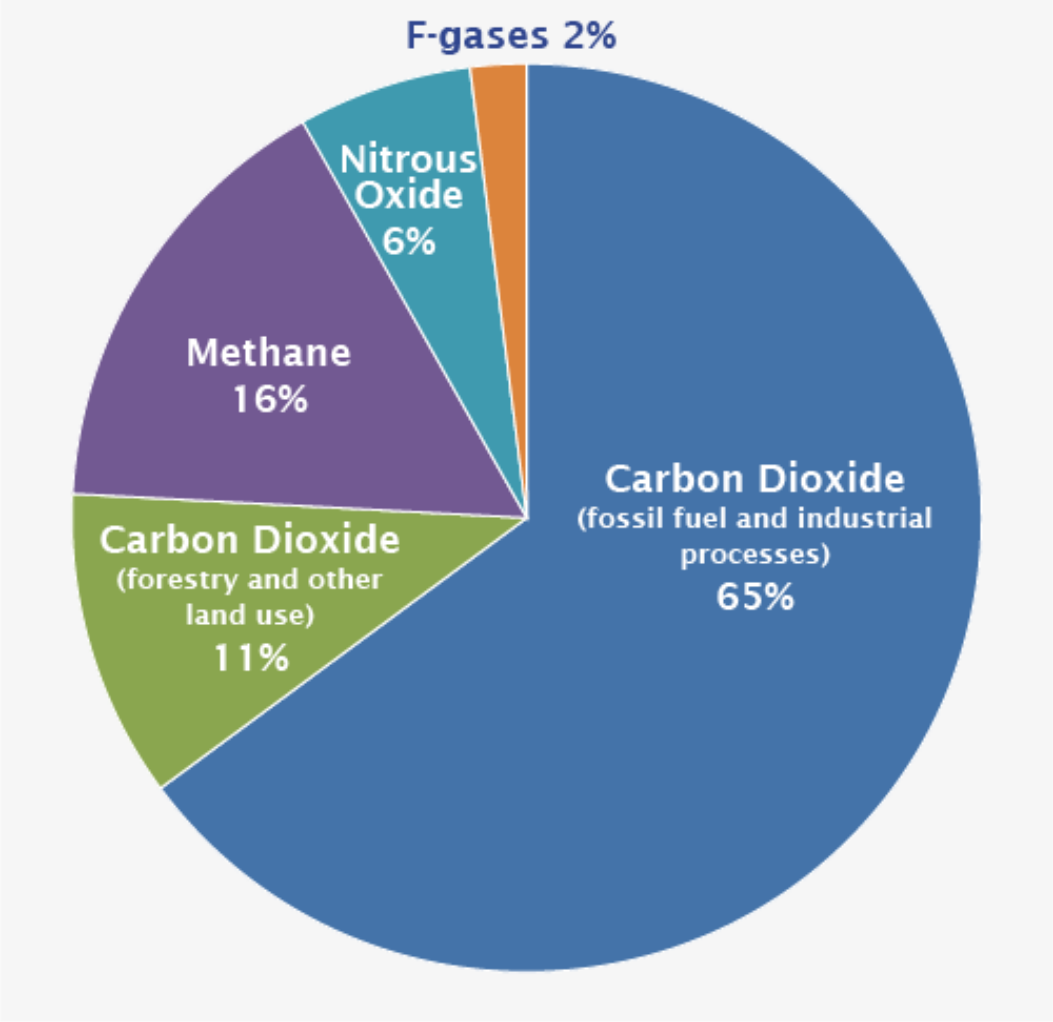
Methane (CH_4): Agricultural activities, waste management, energy use, and biomass burning all contribute to CH_4 emissions.

Nitrous oxide (N_2O): Agricultural activities, such as fertilizer use, are the primary source of N_2O emissions. Fossil fuel combustion also generates N_2O

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_6).

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

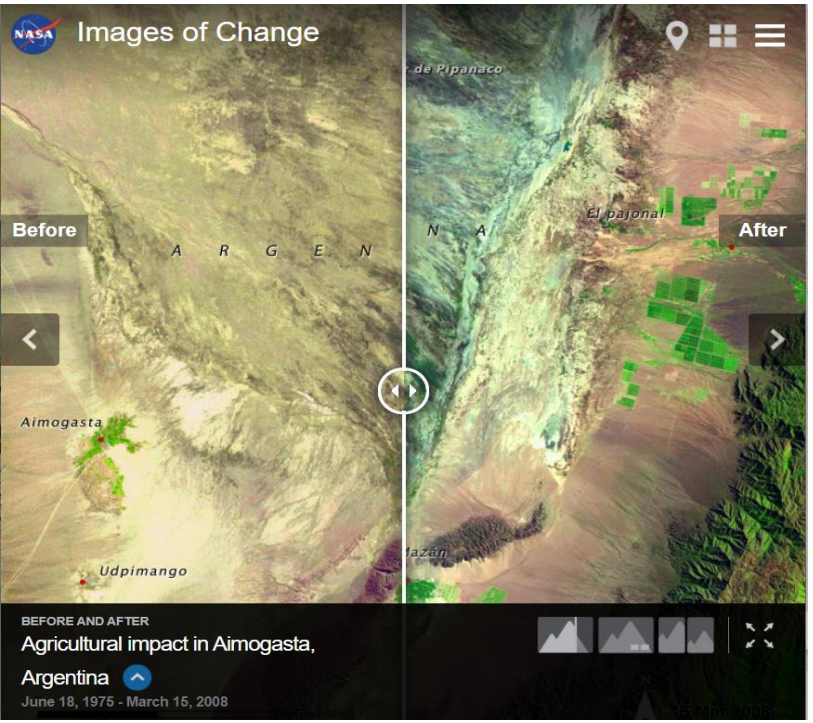
Composition of global greenhouses gas (GHG)



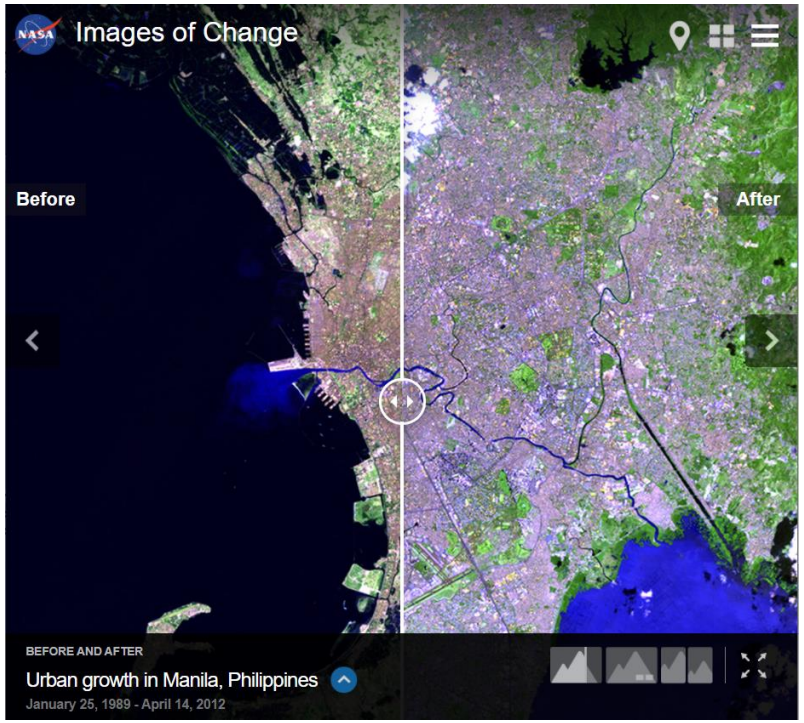
SOURCE: IPCC (2014), https://www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data

Effects of climate change?

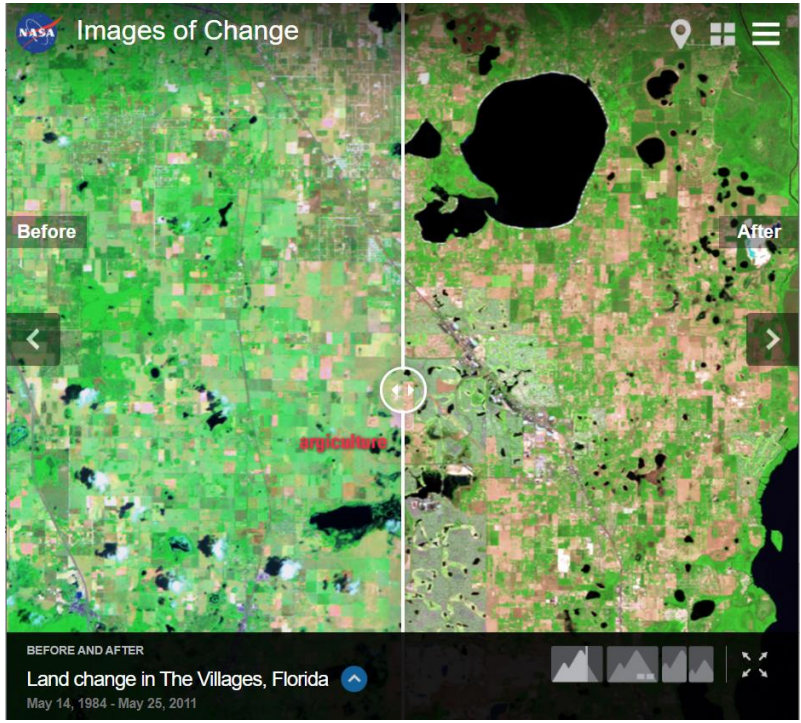
Effects of climate change on cities



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).

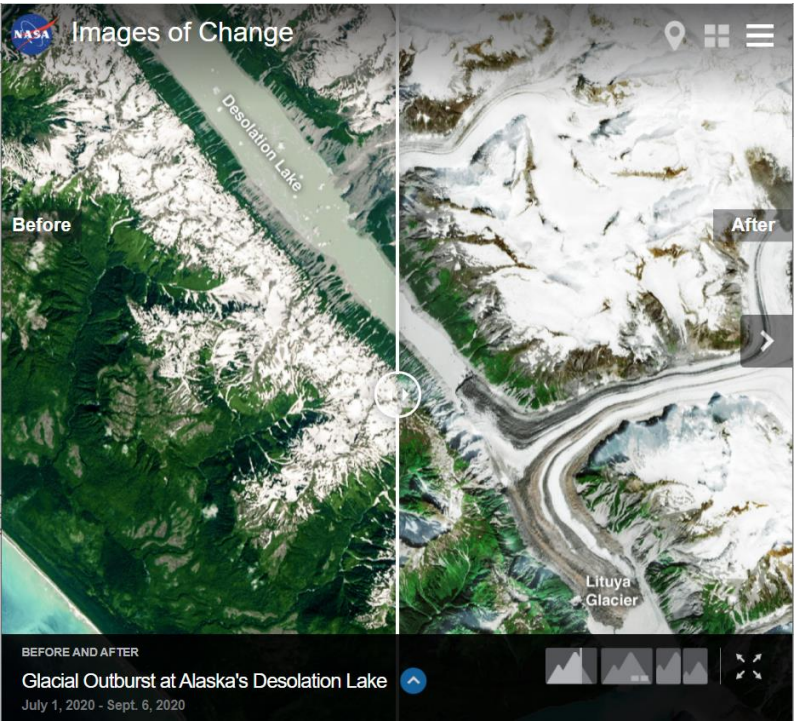


The Philippine capital of Manila is the most densely populated city in the world, with more than 1.6 million inhabitants in 14.8 square miles (38.5 square kilometers). The greater metro area covers 246 square miles (638 square kilometers) and hosts a population of over 11 million. These satellite images 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**.

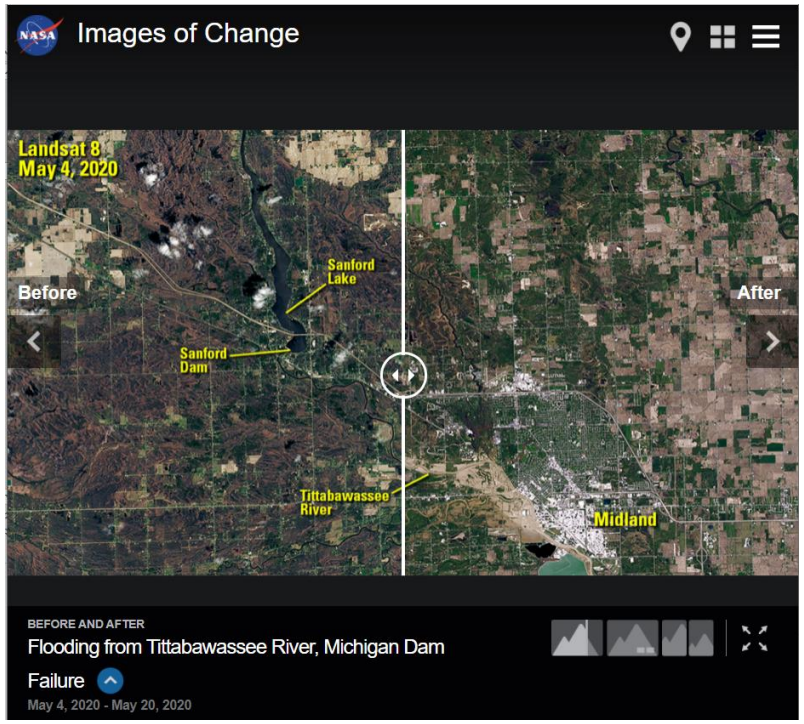


As the U.S. population has aged, more older people have been moving from northern states to southern communities. Sumpter County in central Florida grew 75 percent since 2000, largely **due to expansion of The Villages, a master-planned retirement community with a strong emphasis on golf**. Started as 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.

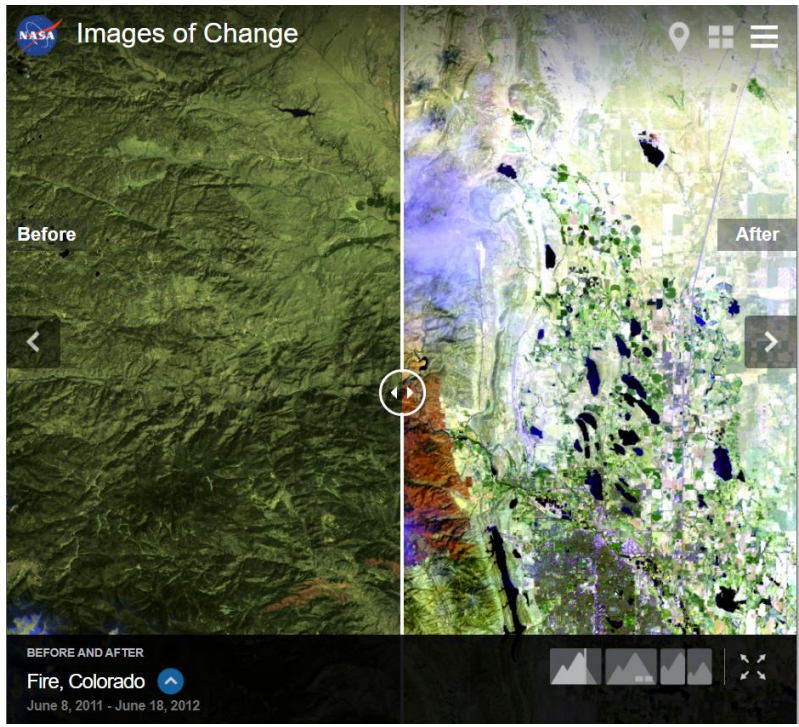
Effects of climate change on extreme events



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.

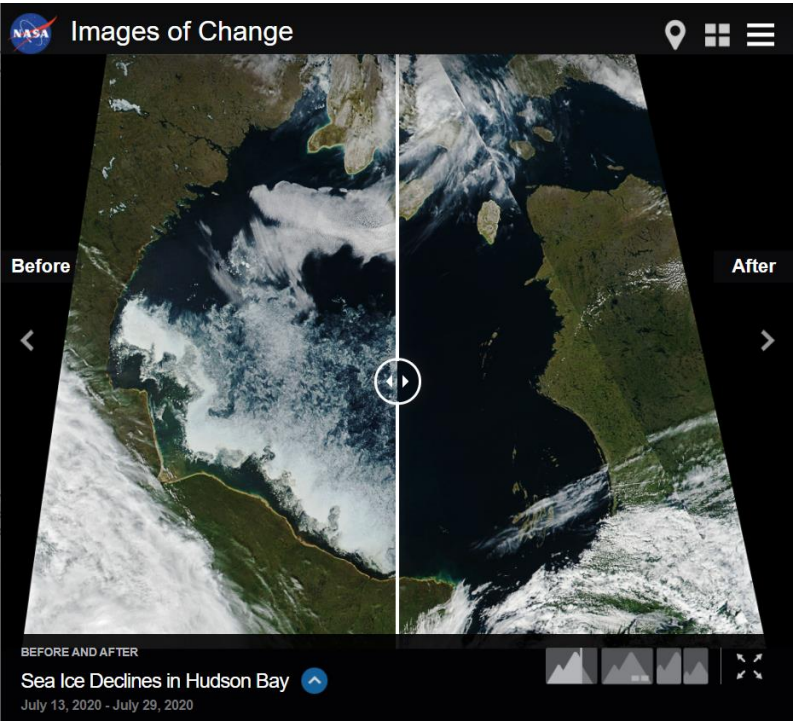


Sanford Dam failed on May 19, 2020, **flooding the area downstream**. The image on the right was taken the following day, when the Tittabawassee River peaked some 10 feet above flood stage at Midland, Michigan. Muddy floodwater is visible spilling onto land near the river. The image on the left shows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

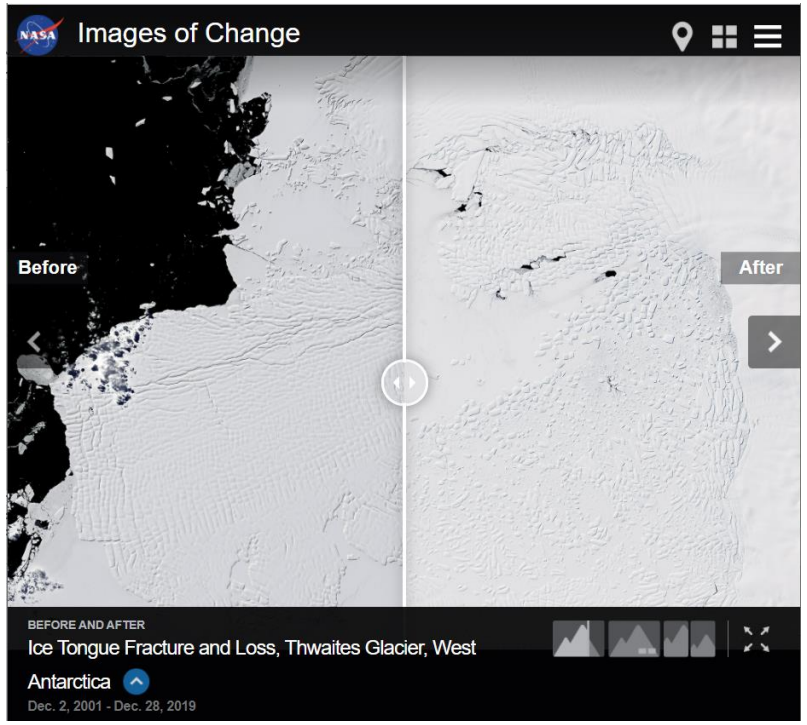


Sparked by lightning on June 9, 2012, the High Park Fire burned more than 87,000 acres near and in Roosevelt National Forest, just west of Fort Collins, Colorado. One person was killed and at least 259 homes were destroyed. **High temperatures and strong winds hampered efforts to extinguish the blaze**,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

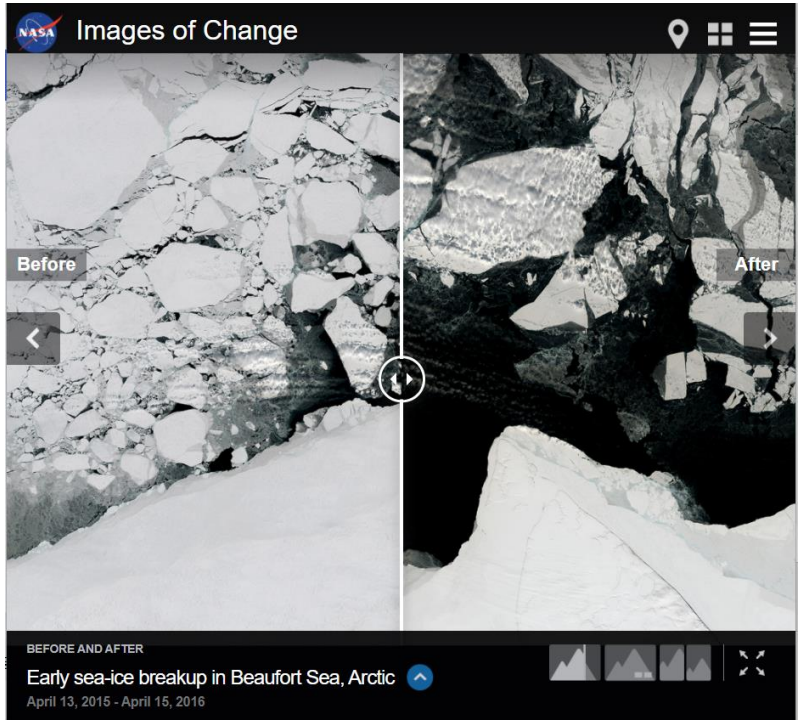
Effects of climate change on ice



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.



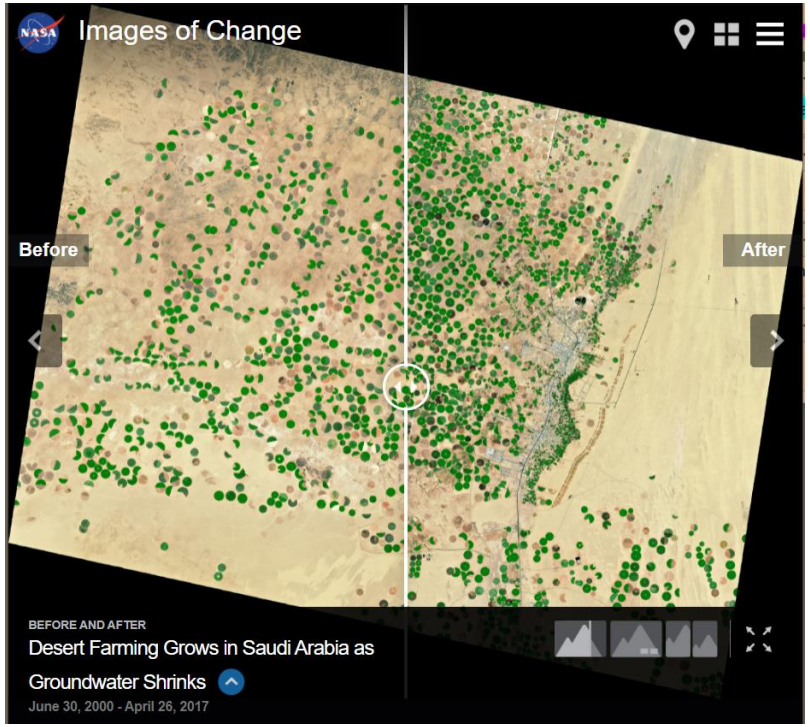
A thick mass of floating ice, called an "ice tongue," stretches from Thwaites Glacier, which sits on solid ground in West Antarctica, into the Amundsen Sea. These images show the **fracturing and loss of much of the ice tongue** from 2001 to 2019. **Ice moving from land to sea contributes to sea-level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



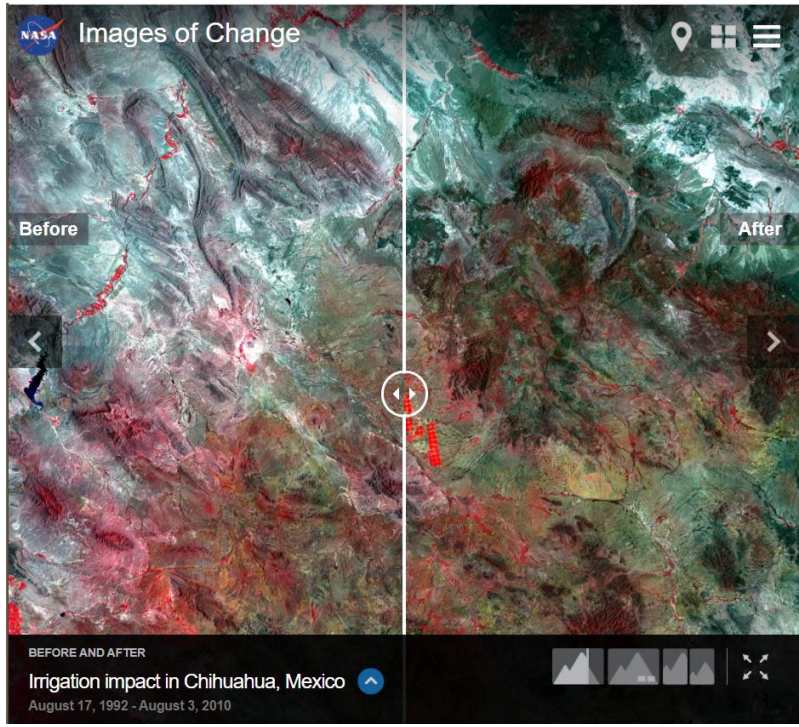
Ice in the Beaufort Sea, off the Arctic Ocean, suffered significant fracturing and breakup by mid-April in 2016, considerably earlier than the late-May period when this usually happens. NASA ice specialists attribute the **change to unusually warm air temperatures** during the first months of the year 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.**

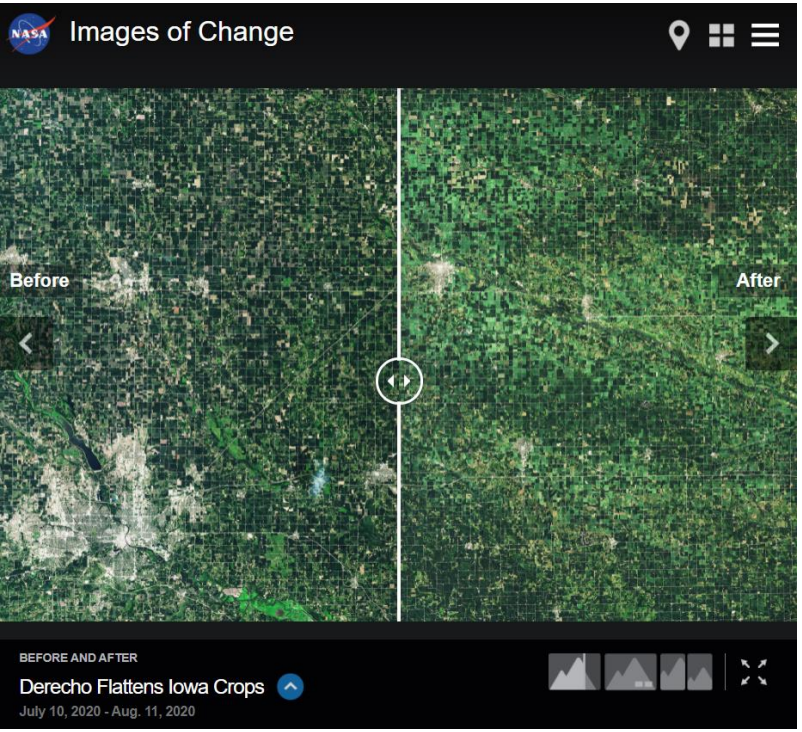


These images show an **increase in crops near the Saudi Arabian town** of Wadi ad-Dawasir, **which are irrigated with a shrinking supply of groundwater**. Studies using data from NASA's GRACE satellite system found that the Arabian Peninsula has the most stressed of the world's 37 largest aquifers, especially 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.**

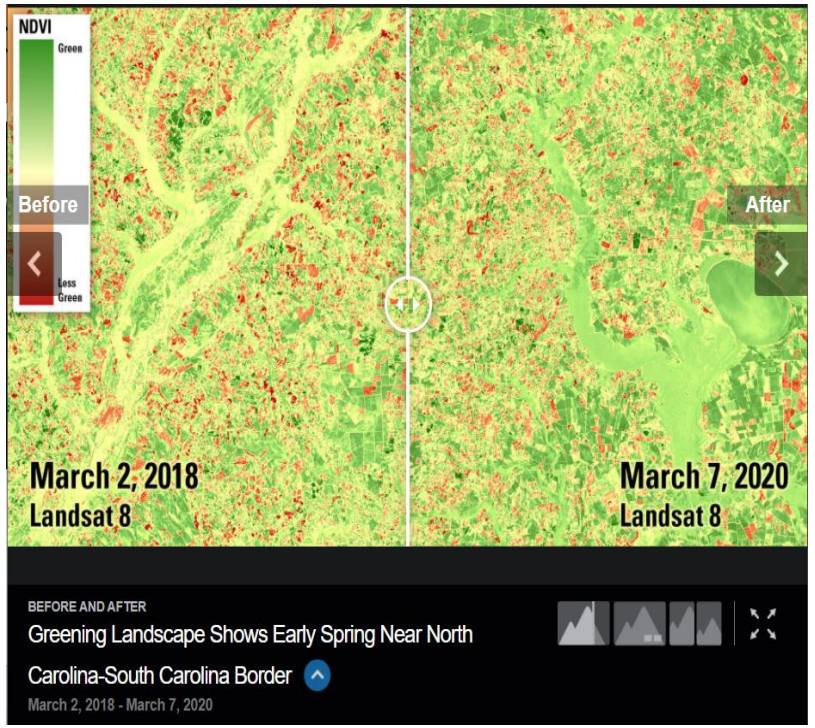


These images illustrate major changes in agricultural practices in the Mexican state of Chihuahua. Increased diversion of water from the Luis L. Leon **Reservoir for agricultural irrigation has affected vegetation patterns** in the northeastern part of Chihuahua and significantly **reduced the amount 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**.

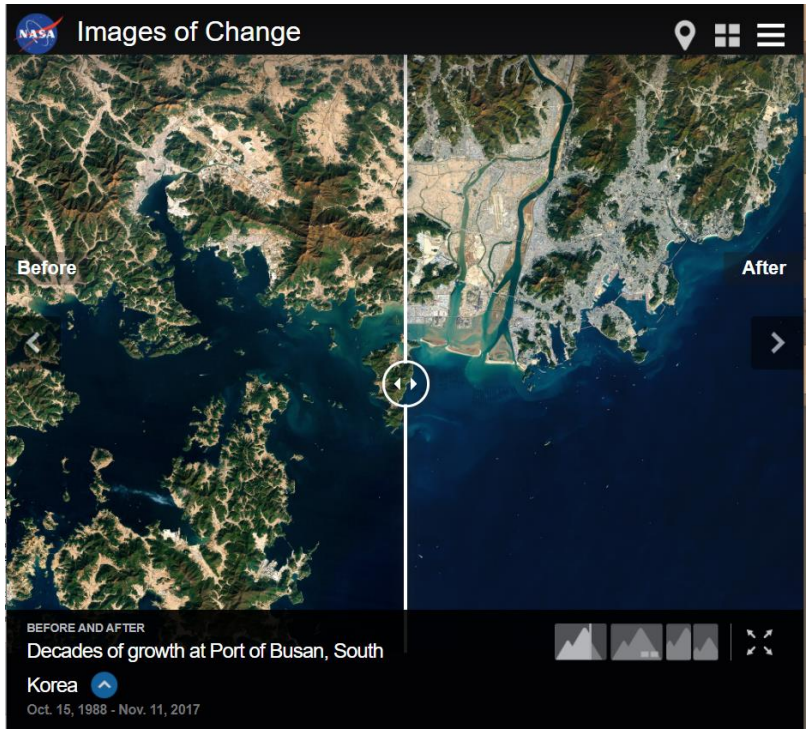
Effects of climate change on land cover



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**.

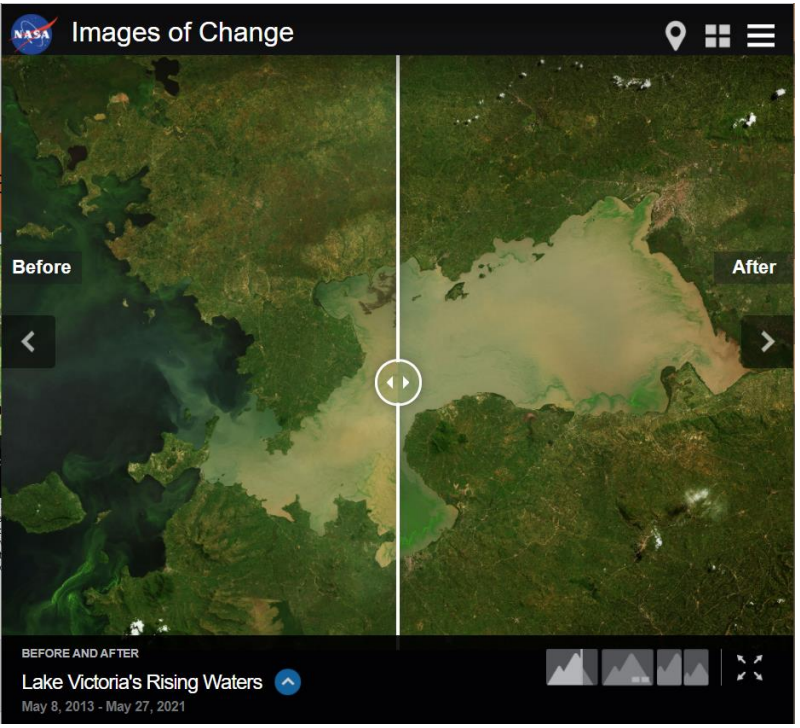


In much of the U.S., **spring began unusually** early in 2020. These images compare an area near the border of North and South Carolina in early March of 2018 and 2020. In the latter year, **the area saw its earliest eruption on record of leaves and flowers**. The two images wouldn't look very different 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.

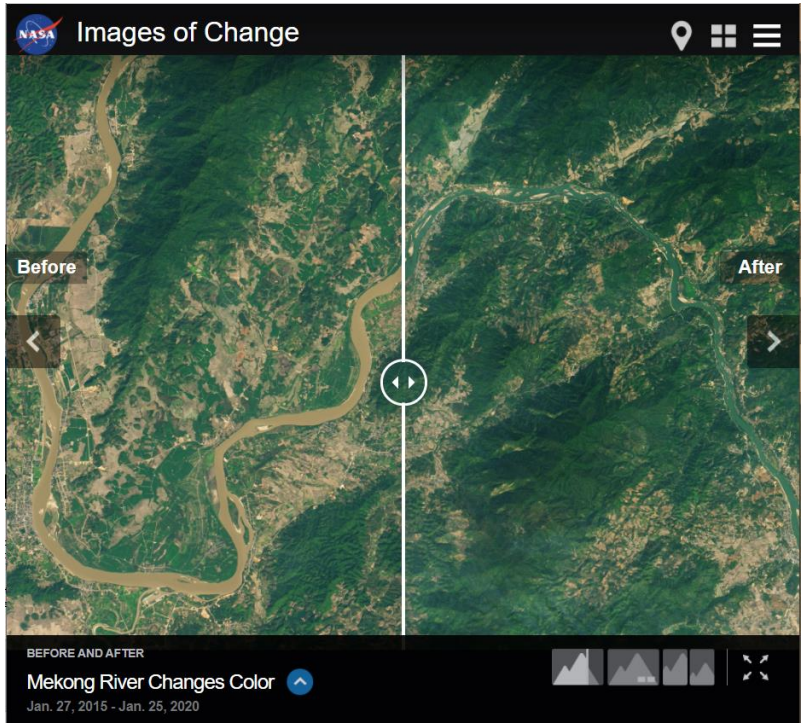


These images show changes from 1988 to 2017 in the Port of Busan region at the southeastern tip of the Korean Peninsula, including the addition of Busan New Port near Gadeok Island. The World Shipping Council ranks Busan, which has been a trading hub since at least the 15th century, the world's fifth 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.

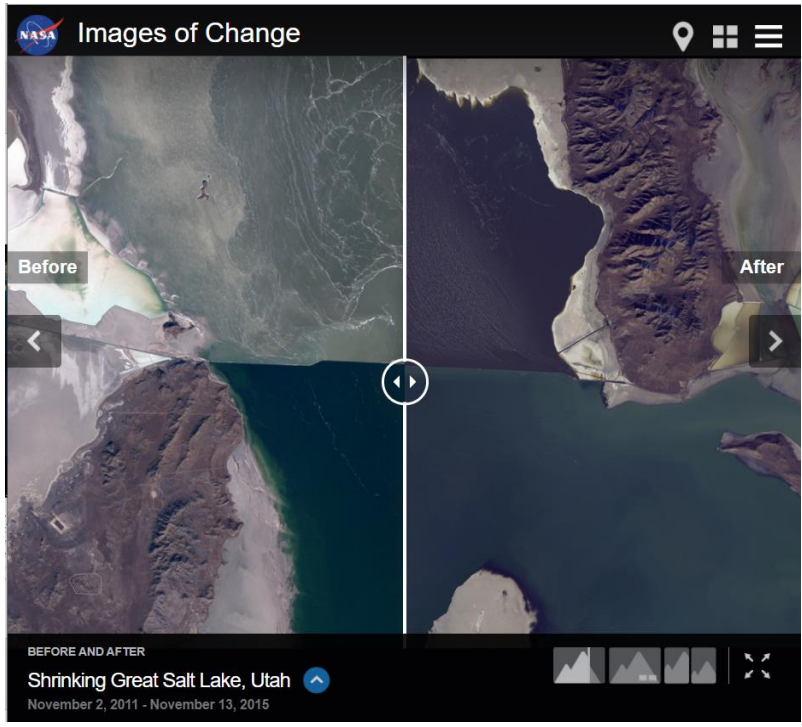
Effects of climate change on water



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.

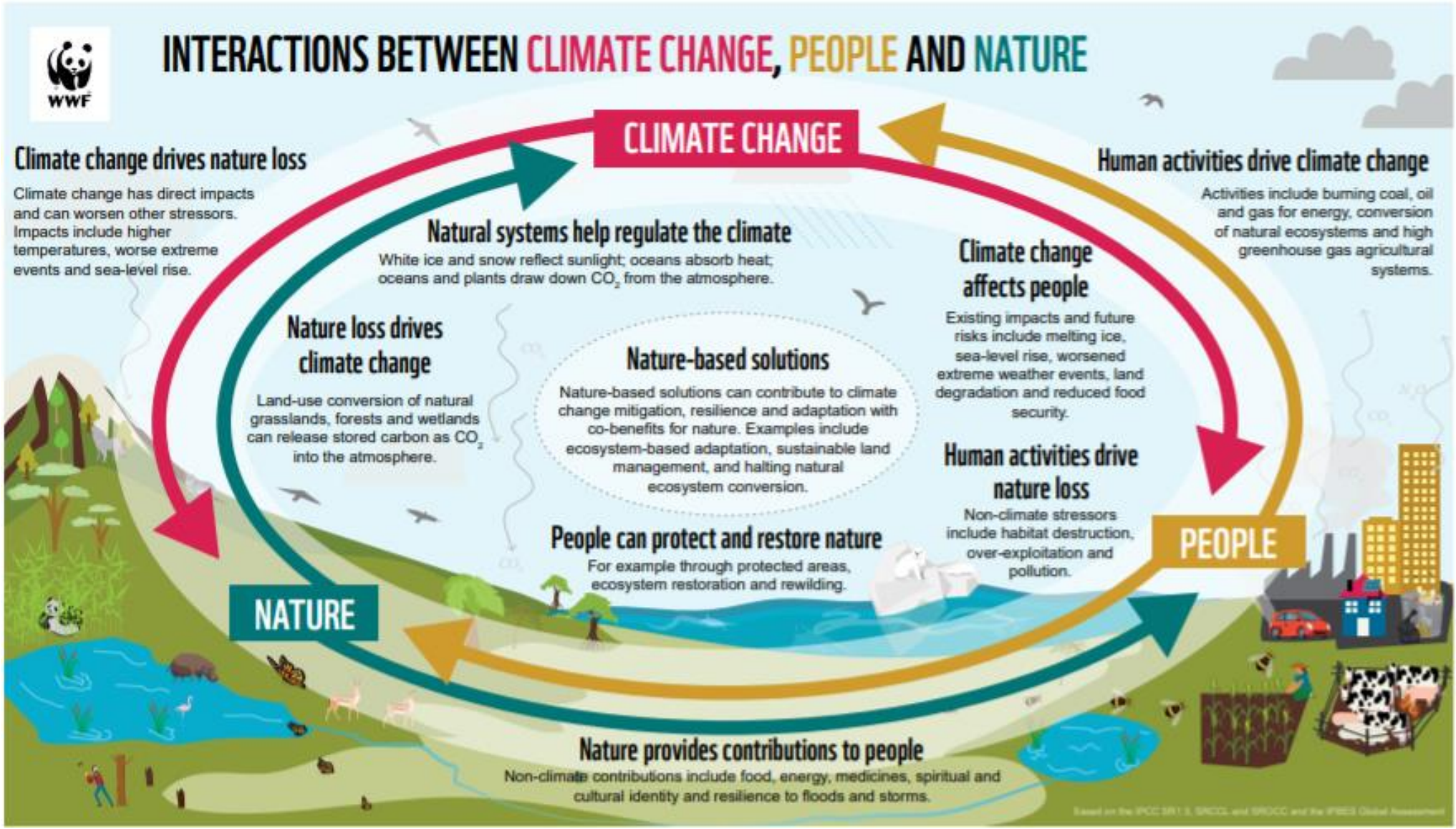


These images show a section of the Mekong River that forms a border between Laos (top) and Thailand. **Its water is normally fast-flowing and loaded with sediments that give it the muddy brown appearance** seen in the 2015 image. **But in the 2020 image, the river was unusually shallow and slow-moving, 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.

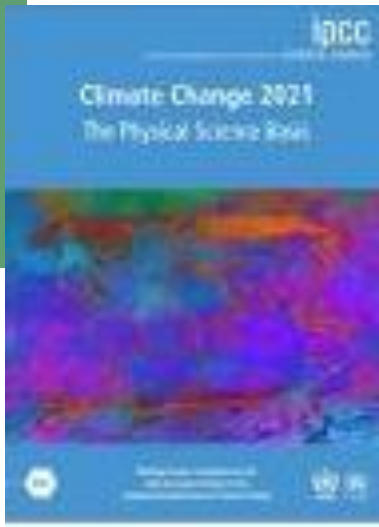
Can we reverse the impacts of climate change?



02

GLOBAL EFFORTS IN ADDRESSING AND MITIGATING CLIMATE CHANGE

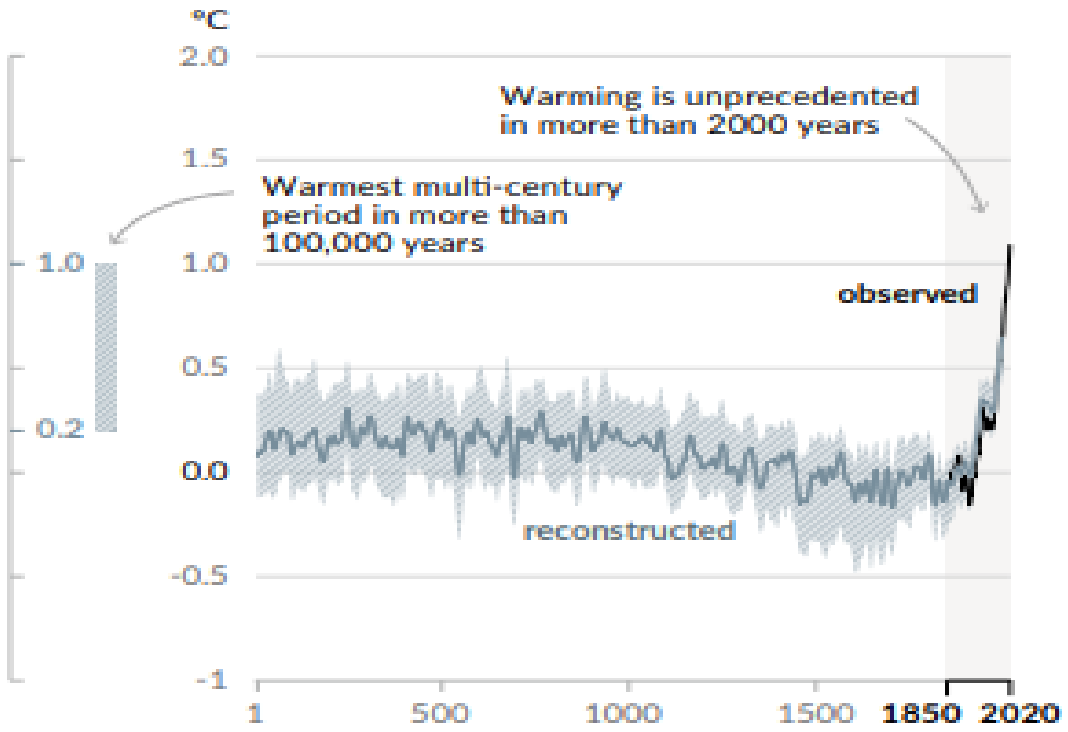
AR6 Climate Change 2021: The Physical Science Basis



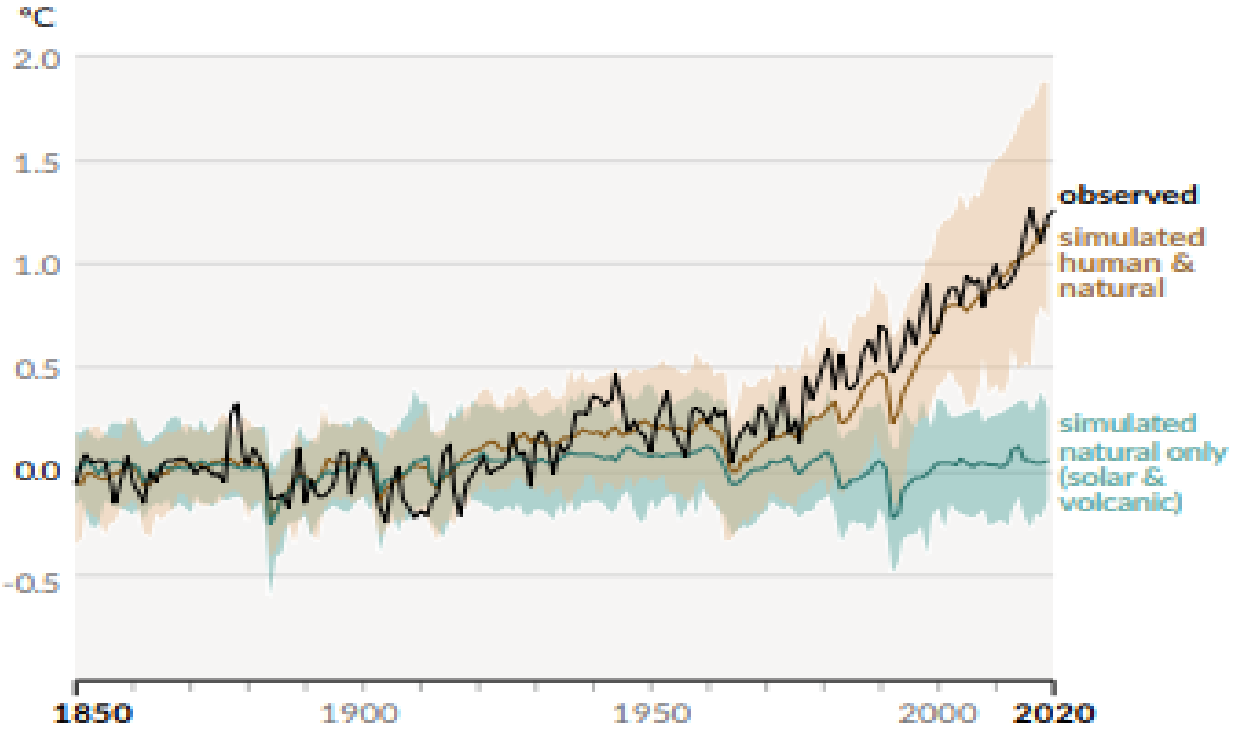
Human activities (anthropogenic activities) have contributed about 1.1°C to global warming since 1850 - 1900

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_2).

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_2 uptake by the oceans.

1960 Curve developed by American climate scientist Charles David Keeling begins to track atmospheric CO_2 concentrations. CO_2 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_2 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_2 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.

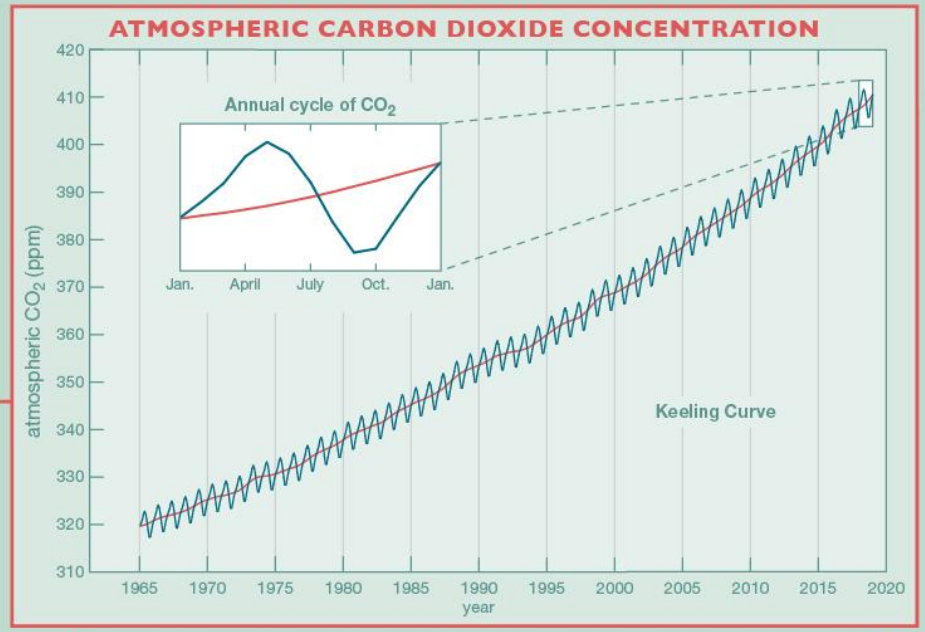
2007 Fourth IPCC report notes that effects of global warming are occurring.

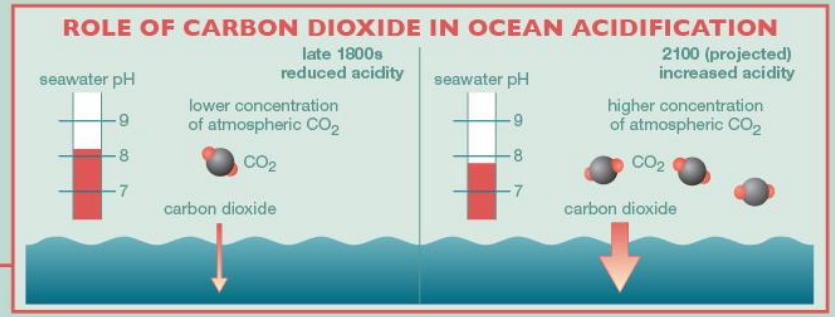
2011 Canada withdraws from the Kyoto Protocol.

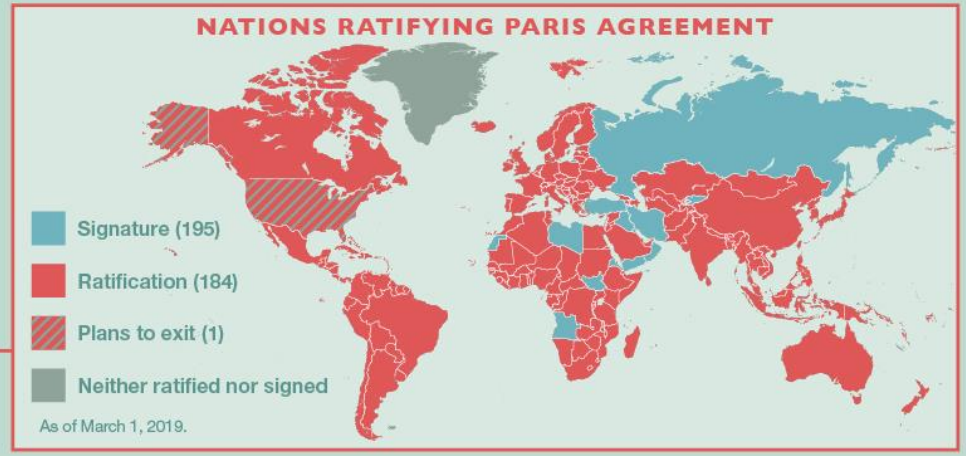
2013 Keeling Curve: CO_2 concentration in 2013 ≈ 400 ppm.

2015 Paris Agreement (which replaces the Kyoto Protocol) is adopted by nearly 200 countries, including the U.S.

2016 Paris Agreement goes into effect.

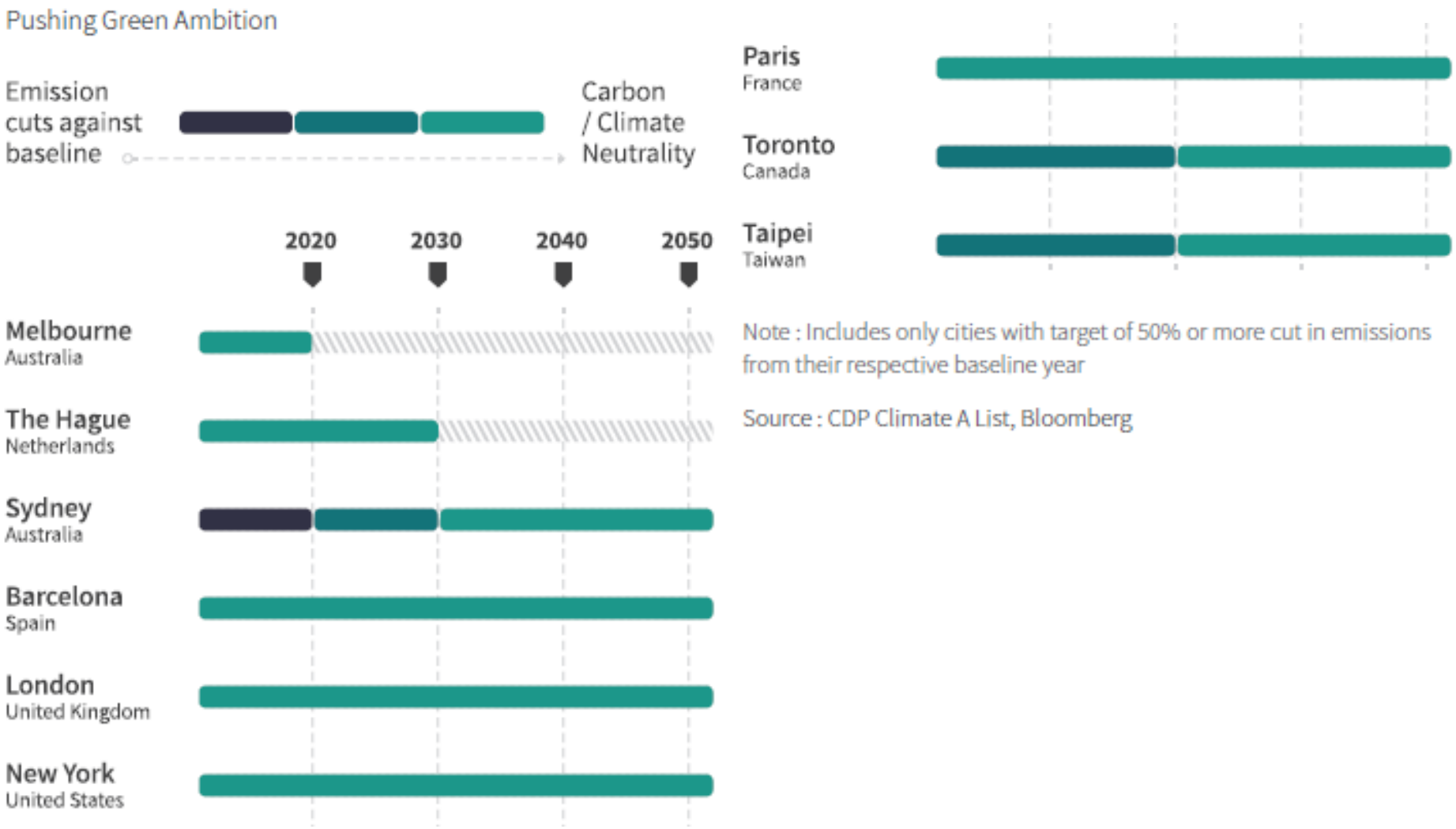




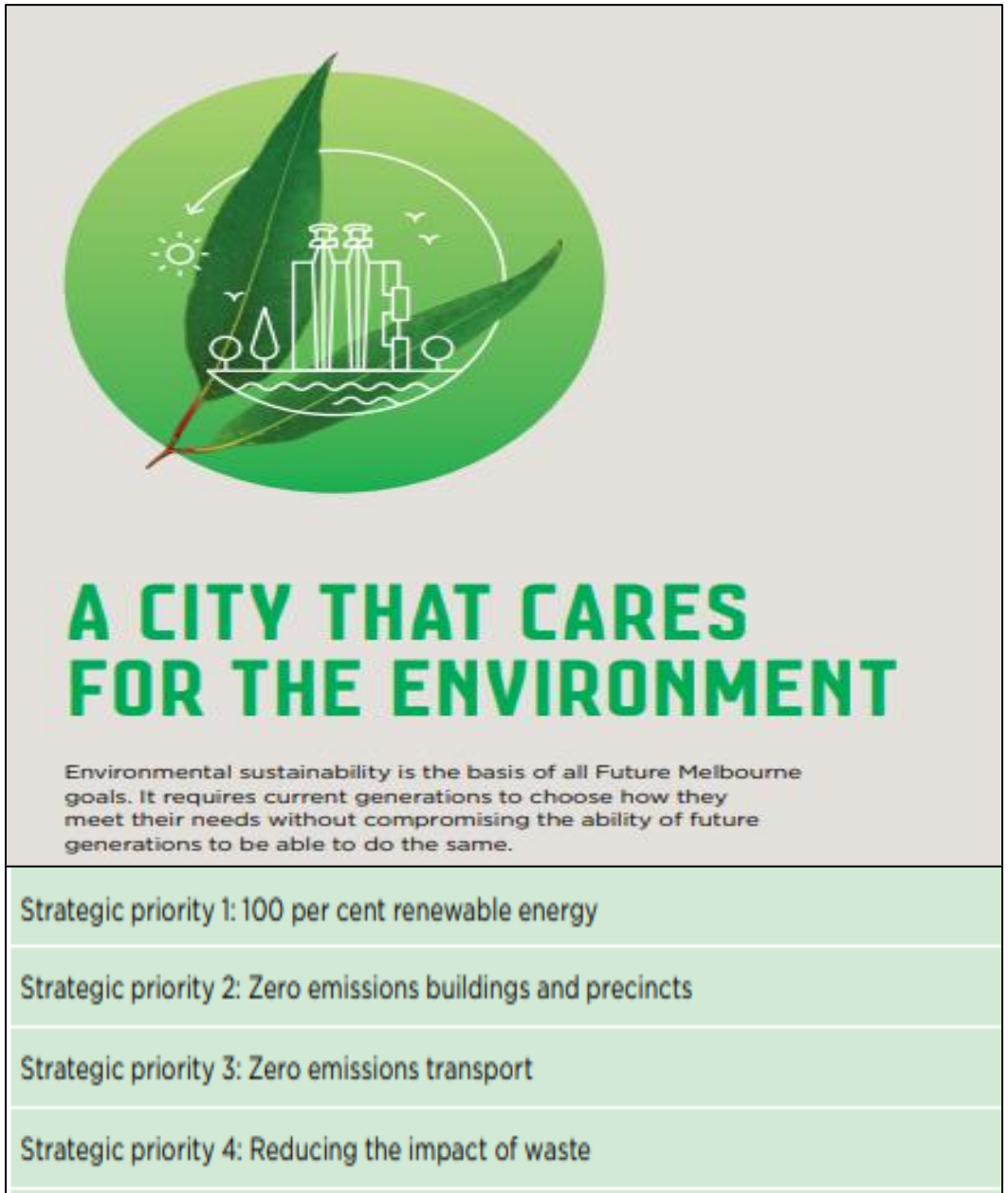


Global Cities Commitment

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.



Global Cities Commitment - Melbourne



- 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.

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

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

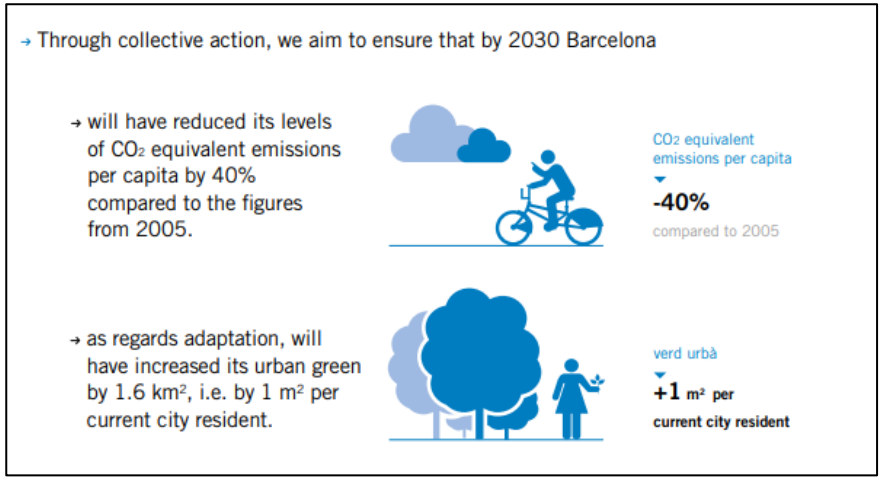
Global Cities Commitment – Barcelona

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

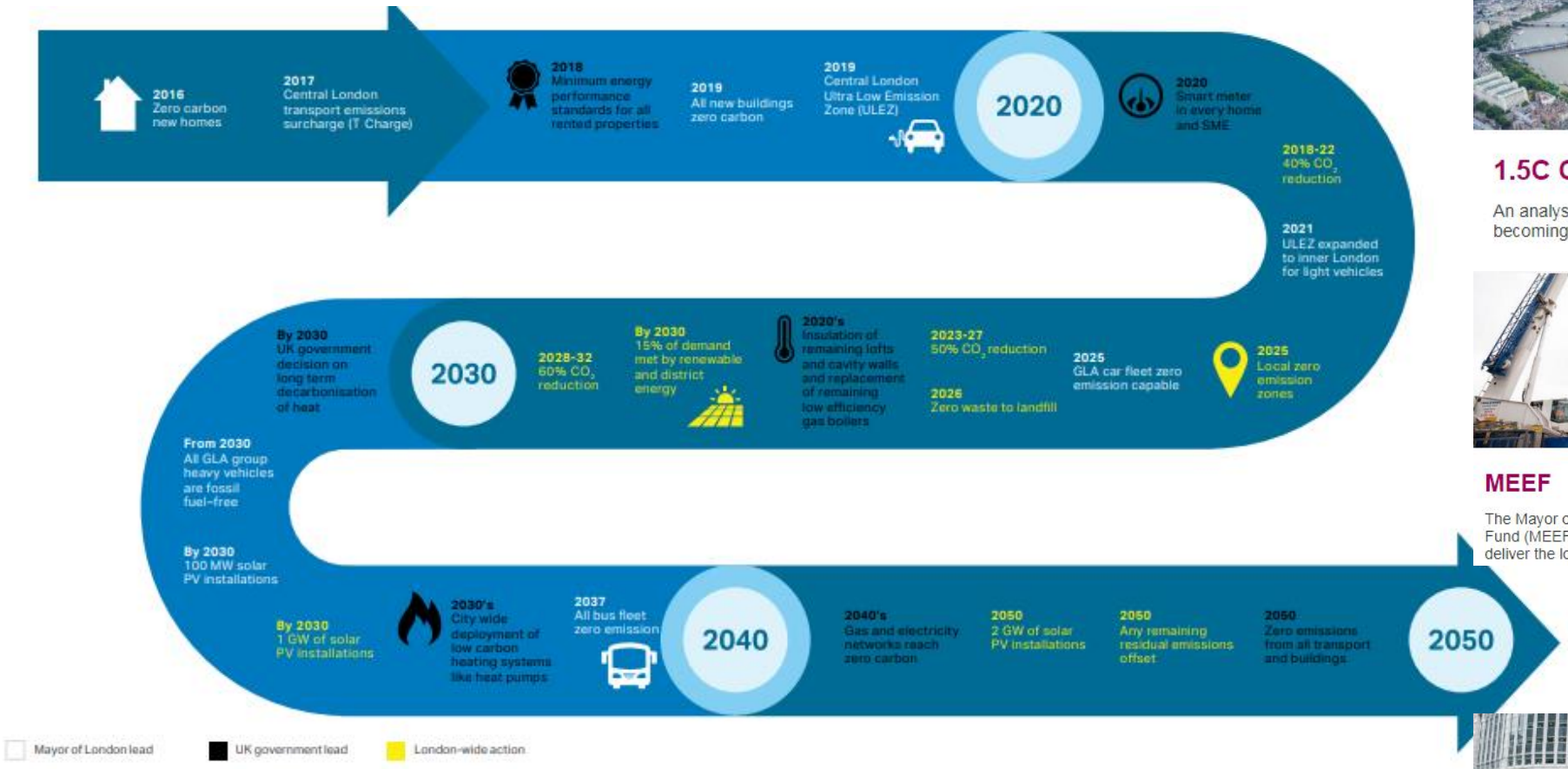
https://www.c40knowledgehub.org/s/article/Barcelona-s-Climate-Action-Plan-2018-2030?language=en_US#:~:text=Barcelona's%20Climate%20Plan%202018%20%2D%202030,becoming%20carbon%20neutral%20by%202050.

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



https://www.c40knowledgehub.org/s/article/Barcelona-s-Climate-Action-Plan-2018-2030?language=en_US

Global Cities Commitment – London



What is needed by 2050?

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

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.

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

- Renewable Energy Portfolio Standard
- Small Wind Turbine Program
- Renewable Heat NY
- NY Sun

https://www.dec.ny.gov/energy/44992.html

Global Cities Commitment – Paris

The Paris Agreement

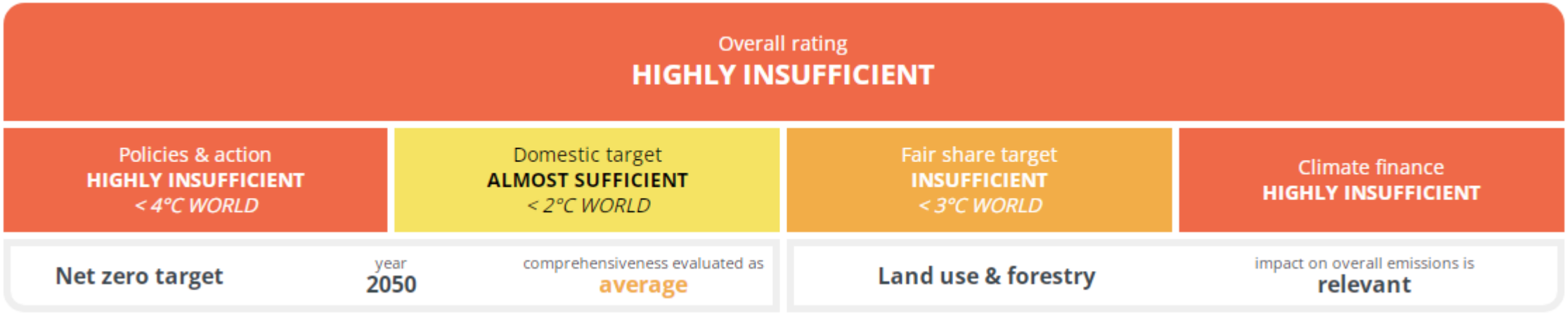
1. The Paris Agreement is a landmark international accord that was adopted by nearly every nation in 2015 to address climate change and its negative impacts.

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

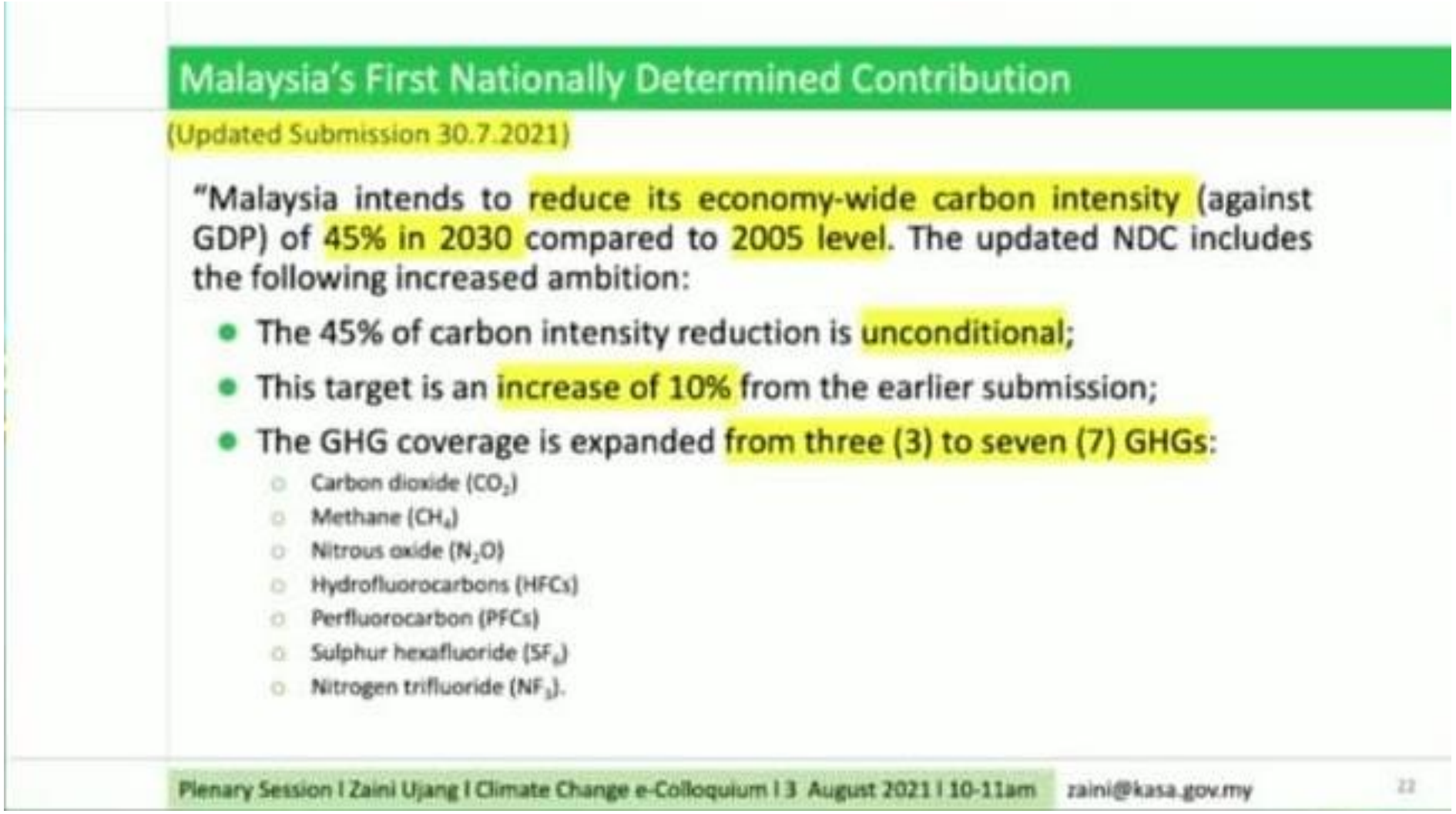
MALAYSIA EFFORTS IN ADDRESSING AND MITIGATING CLIMATE CHANGE

Engagement with the international community

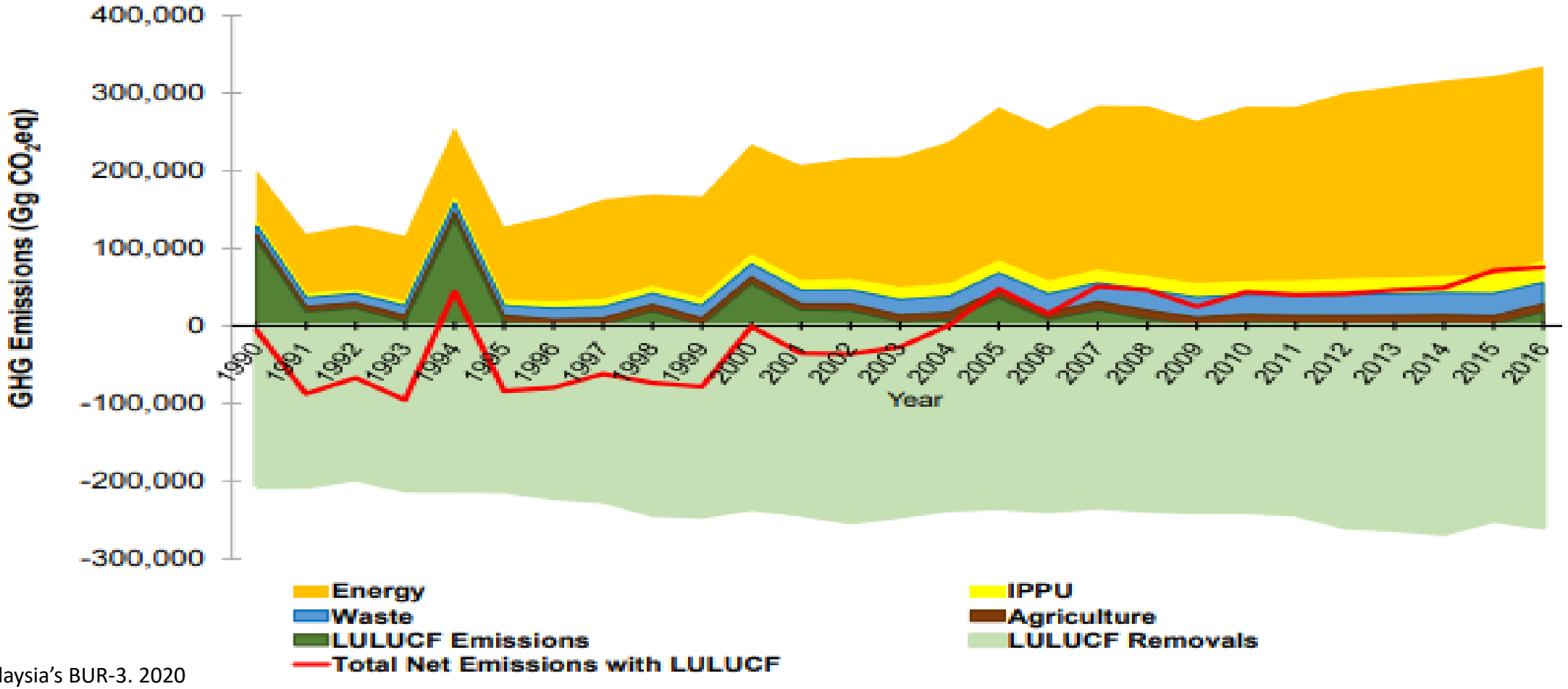
The **Kyoto Protocol** is an international agreement linked to the United Nations Framework Convention on Climate Change which was adopted on 11 December 1997 and came into force on 16 February 2005. The Protocol, which has been ratified by Malaysia, encourages a reduction in the emission of harmful 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's first Nationally Determined Contribution



Malaysia Sectoral Time Series of GHG Emissions from 1990 to 2016



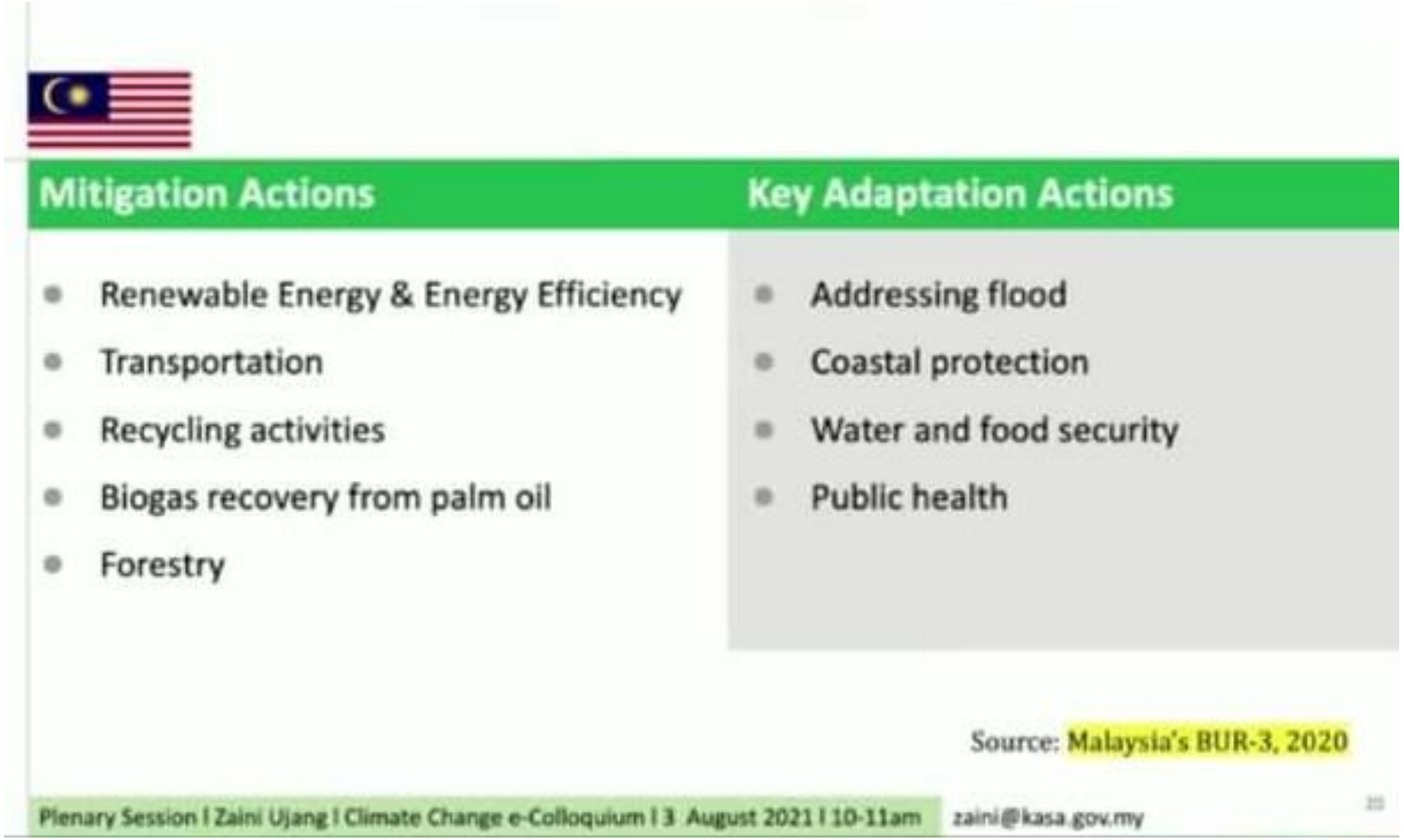
SOURCE: Malaysia's BUR-3. 2020

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	Key Adaptation Actions
• Renewable Energy & Energy Efficiency	• Addressing flood
• Transportation	• Coastal protection
• Recycling activities	• Water and food security
• Biogas recovery from palm oil	• Public health
• Forestry	

Source: Malaysia's BUR-3, 2020

zaini@kasa.gov.my

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 4th 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

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 :

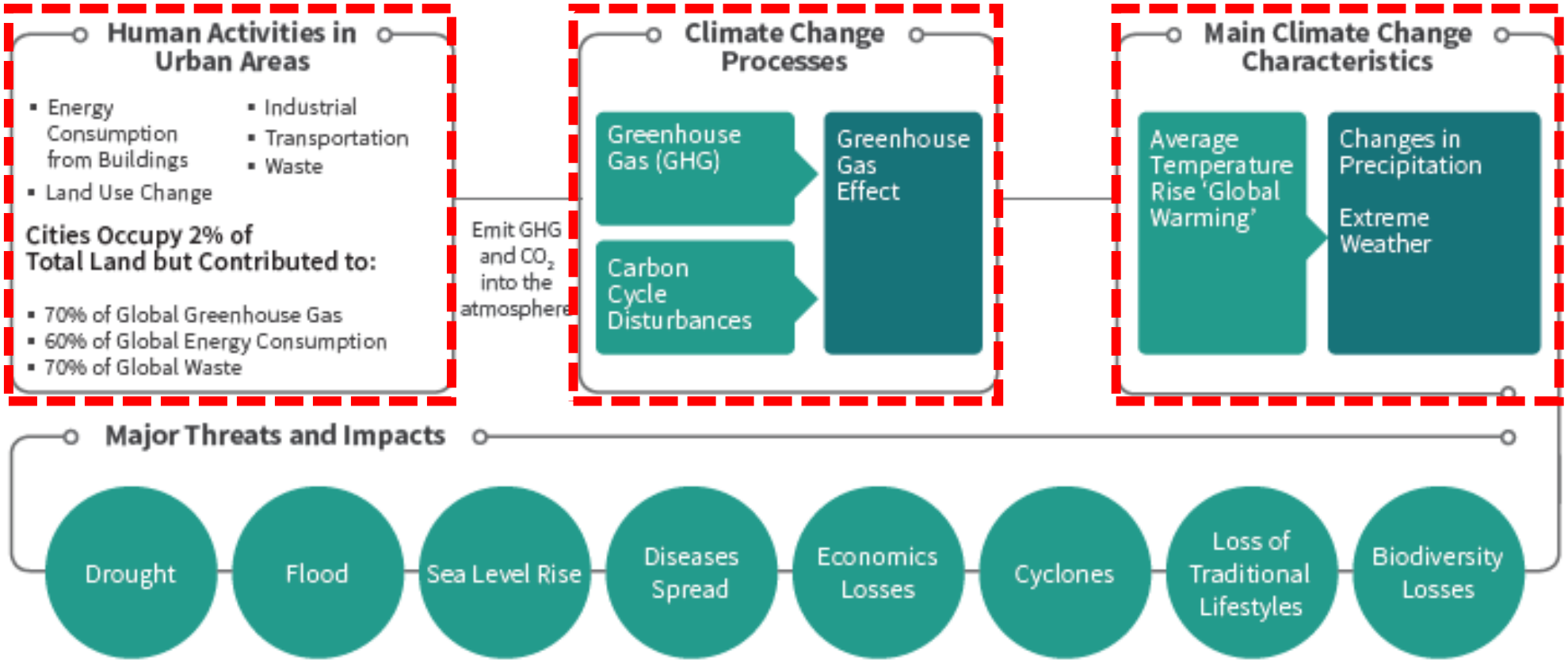
1. **Pursue a systematic approach** – i.e. establish documented strategies and action plans;
2. **Employ area wide strategies** – i.e. cover all potential emission sectors within city boundary; and
3. **Set ambitious GHG reduction target** – i.e. establish baseline/peak as well as short and long term 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_2 and GHG emissions



The 3M approach

The 3M approach is introduces 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.

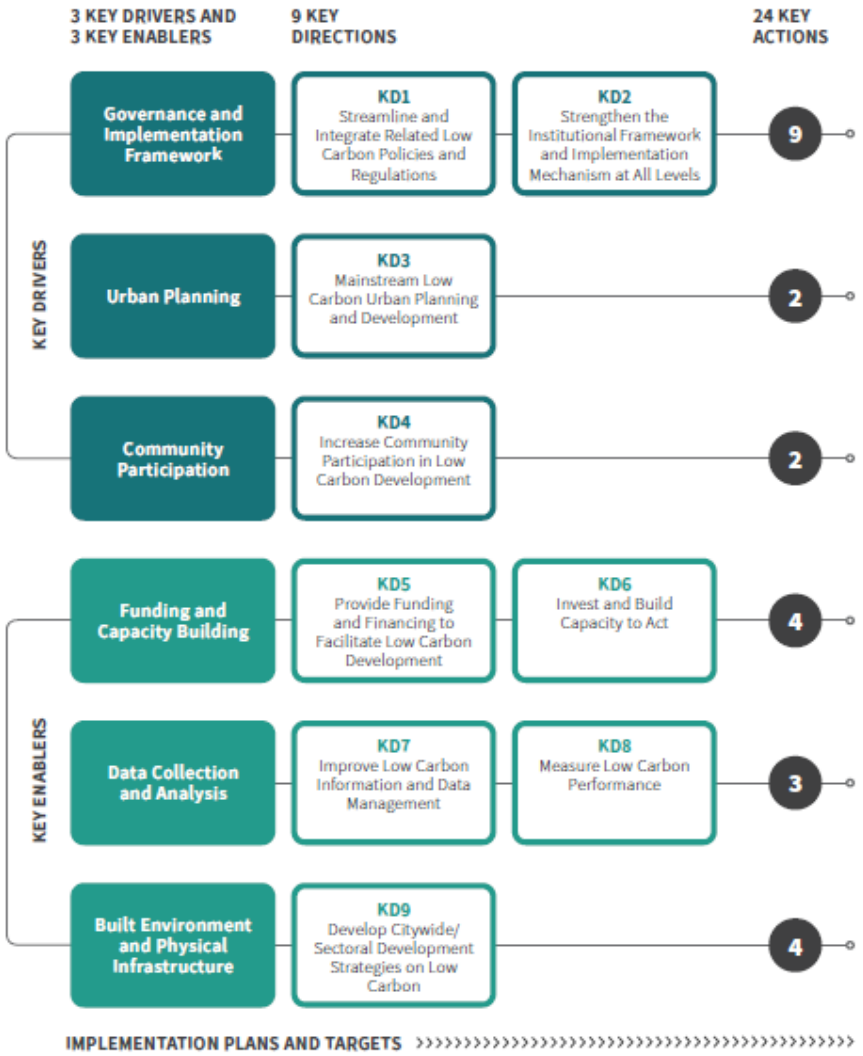
Key challenges

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

Synopsis of the action plans

In shaping the pathway of low carbon development in Malaysia, the following action plans are recommended to drive the transformation.

Transforming Malaysian cities into low carbon



9 key directions and 24 key actions

Key Drivers for Low Carbon Development

KD1 : Streamline and Integrate Related Low Carbon Policies and Regulations

Action 1.1	Align Existing Regulation and Laws to Support Low Carbon Cities Development
Action 1.2	Align National Climate Change Policy (NCCP) to Support Low Carbon Cities Development
Action 1.3	Establish Absolute Carbon Reduction Targets for Targeted Cities (2021 - 2050)
Action 1.4	Establish Policies to Enable Top Down Approach for Low Carbon Implementation at State Level
Action 1.5	Integrate Low Carbon Guidelines and Components into Existing and New Planning Development Documents
Action 1.6	Promote Agriculture, Forestry and Other Land Uses (AFOLU) as Part of GHG Reduction Measures

KD2 : Strengthen the Institutional Framework and Implementation Mechanism at All Levels

Action 2.1	Improve the Governance and Implementation Structure at Federal and State Levels
Action 2.2	Strengthen the Implementation Mechanism at the Ground Level

KD3 : Mainstream Low Carbon Urban Planning and Development

Action 3.1	Embed Low Carbon Elements in Urban Planning and Development
Action 3.2	Develop Standard Guideline of GHG Emission Reduction Strategies for Easy and Consistent Implementation at Ground Level

KD4 : Increase Community Participation In Low Carbon Development

Action 4.1	Nurture Active Participation and Awareness through Effective Communication Plan
Action 4.2	Use Education to Foster Human Behavioural Changes to Sustainable Practices

Key Enablers for Low Carbon Development

KD5 : Provide Funding and Financing to Facilitate Low Carbon Development

Action 5.1	Create Specific Low Carbon Development Fund and Budget to Implement Low Carbon Programmes and Initiatives
Action 5.2	Create Alternative Funding to Finance Low Carbon Initiatives and Programmes at Local Level

KD6 : Invest and Build Capacity to Act

Action 6.1	Develop and Place Dedicated Officers at State and Local Levels to Increase Productivity and Create Holistic Manpower Support System
Action 6.2	Develop and Nurture Knowledge, Expertise and Skills in Low Carbon Development Area at State and Local Levels

KD7 : Improve Low Carbon Information and Data Management

Action 7.1	Establish Proper and Efficient System of Data Collection and Management for GHG Inventory Purposes
Action 7.2	Develop Central Online System on GHG Emission Reporting and Data Management to be Used at All Levels

KD8 : Measure Low Carbon Performance

Action 8.1	Align Performance-Based Tools to Global Protocol For Community-Scale Greenhouse Gas Emission Inventories (GPC)

KD9 : Develop Citywide/Sectoral Development Strategies on Low Carbon

Action 9.1	Spatial Planning and Development
Action 9.2	Energy
Action 9.3	Transportation
Action 9.4	Waste

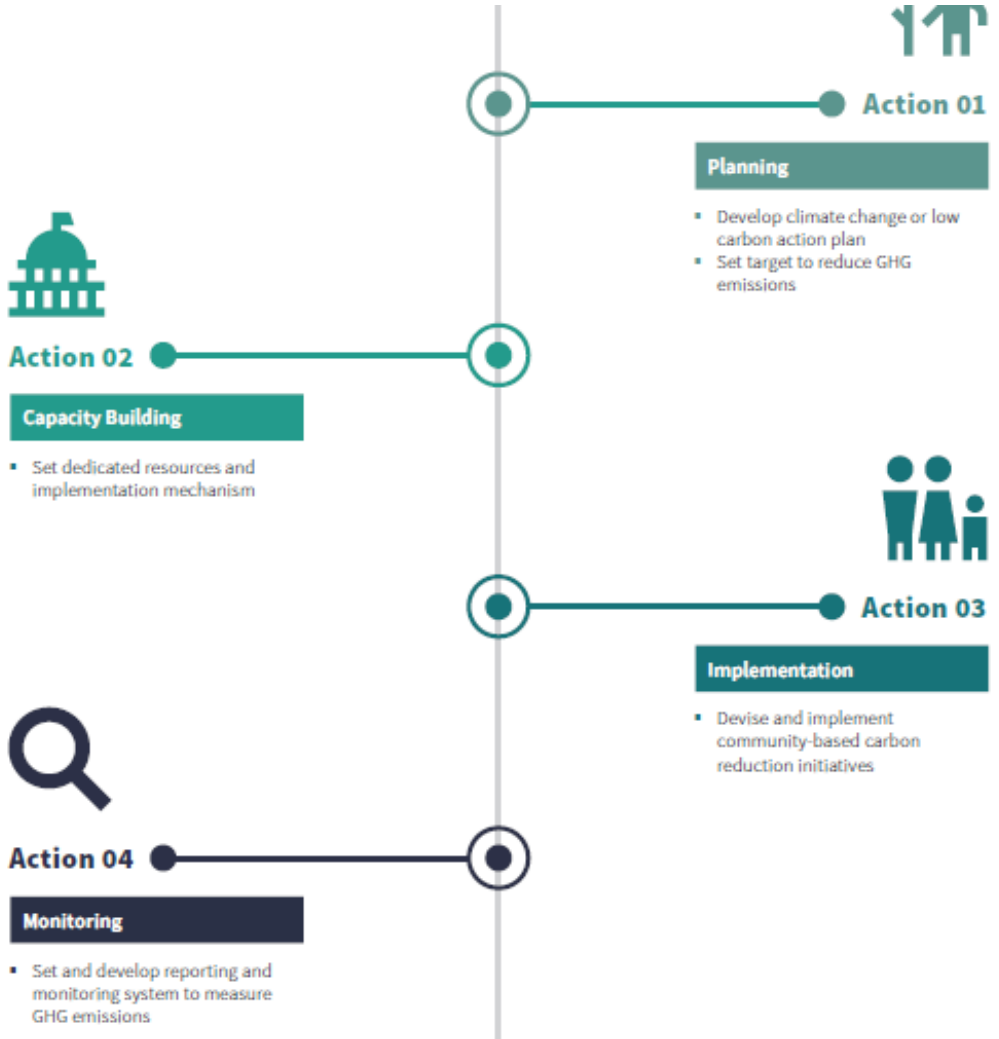
Target cities and others cities

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

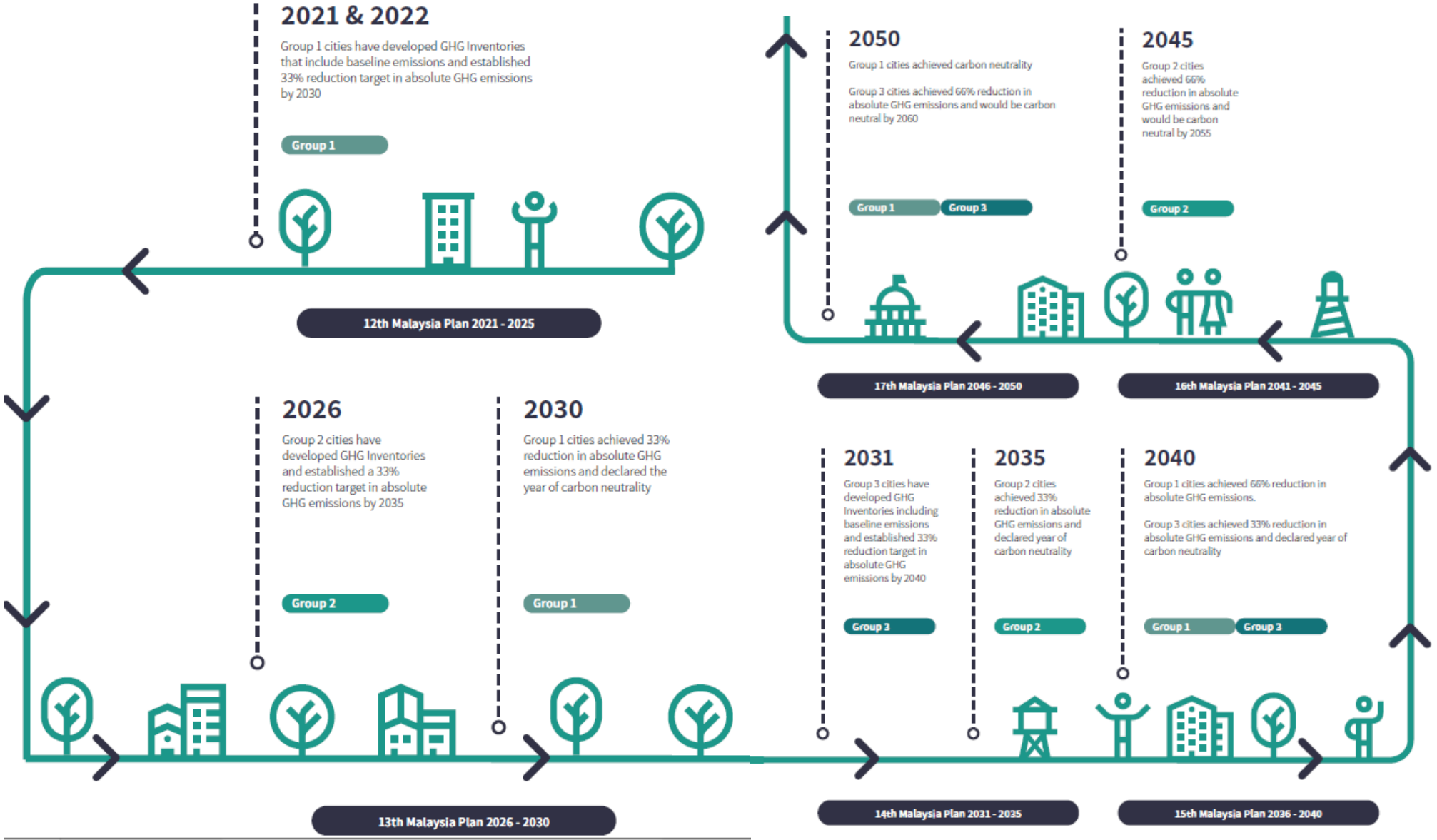
Group 1	Group 2	Group 3
1. Hang Tuah Jaya Municipal Council	1. Alor Setar City Council	1. Kota Bharu Municipal Council
2. Iskandar Malaysia	2. Ampang Jaya Municipal Council	2. Kota Kinabalu City Hall
3. Iskandar Puteri City Council	3. Ipoh City Council	3. Kuala Terengganu City Council
4. Johor Bahru 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

MALAYSIA CITIES COMMITMENT

Low carbon cities 2030 challenge

LOW CARBON CITIES 2030 CHALLENGE

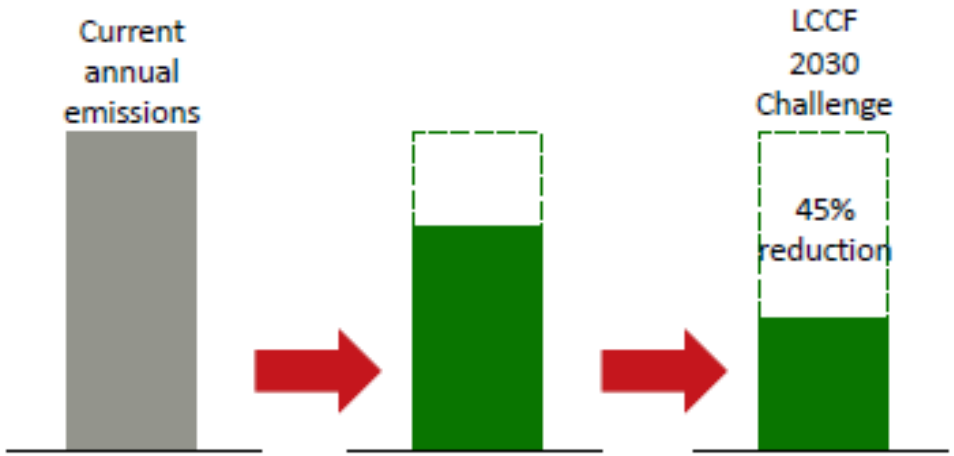
Cities are responsible for over 70% of GHG emissions.

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.

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.

DRIVER 2

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

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_2 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_2 sequestration from:

- Trees, green spaces and water bodies

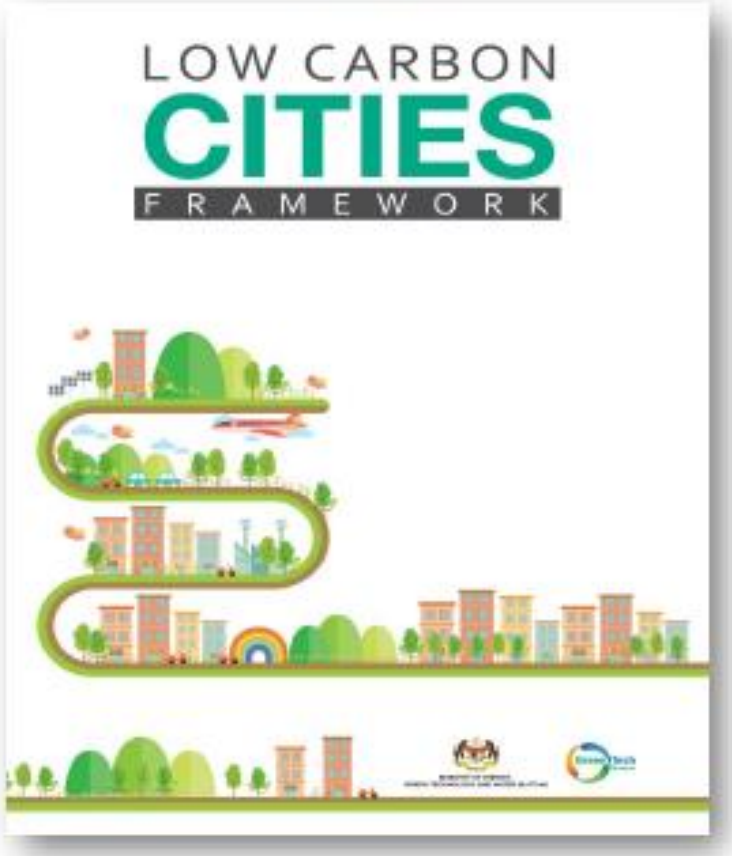
The LCC 2030 Challenge targets a total of 45% CO_2 emissions reduction by adopting these measures:

- 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

<YOUR LOW CARBON ZONE>
LCC 2030
CHALLENGE

Applicable for (area > 50 hectares):

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

INDIVIDUAL BUILDING / ORGANISATION

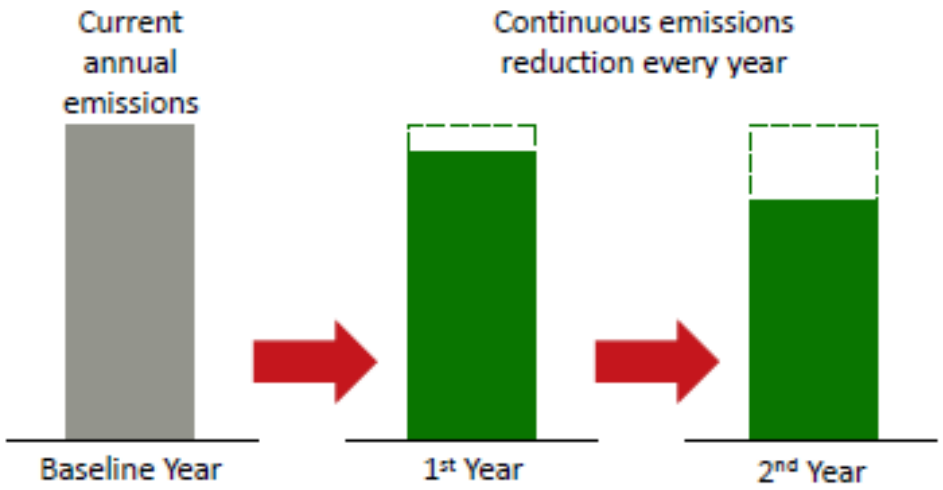
Applicable for:

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

Low carbon cities 2030 challenge

ASSESSMENT & RECOGNITION

ASSESSMENT



4 step process:

MEASURE → MANAGE → REDUCE → CERTIFY

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

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

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

	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

06
Low Carbon Lifestyle

	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_2 emission and expenditure in residential and community

LCCC participation - Iskandar Malaysia

07
Community Engagement and Consensus Building

	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

08
Walkable, Safe, Livable City Design

	Sub-actions	Measures
1	Designing Walkable City Centers and Neighbor-hoods	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-benefit s 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

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)

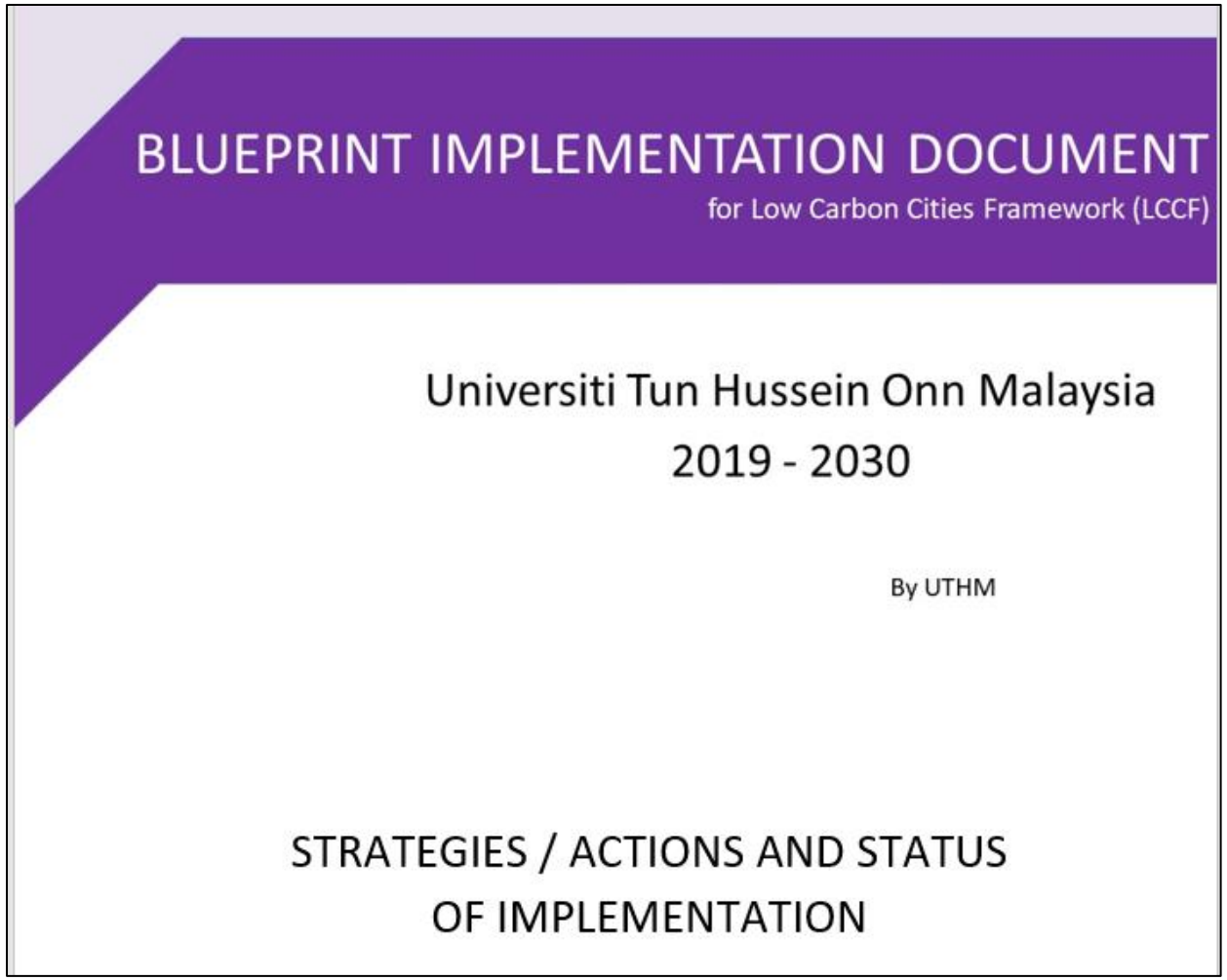
Green and Blue Infrastructure and Rural Resources

	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



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 (2nd 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

"Reengineering Sustainability..."

UTHM
Universiti Tun Hussein Onn Malaysia

SWIDWEB COMPOSTING SITE

SWIDWEB SOLUTIONS

SWIDWEB COMPOSTING SITE
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

RPPS
Rumah Pemisahjaran Pemulihan Sumber

WAKTU OPERASI
Operation Hours
Ahad - Rabu
Sun - Wed
8.30 AM - 1.00 PM
Khamis
Thursday
8.30 AM - 1.00 PM
2.00 PM - 3.30 PM

FOR ANY INQUIRIES, PLEASE CONTACT:
EN. MOHD SYARIFUDIN ARIS
SUSTAINABLE CAMPUS OFFICE
018-792 1017

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 RM0.20
- ALUMINIUM CAN RM1.50
- BOOK & MAGAZINE RM0.05
- CARDBOARD RM0.10
- WHITE PAPER RM0.05
- MIXED PAPER RM0.05
- NEWSPAPER RM0.10
- HARD PLASTIC RM0.15
- MIXED PLASTIC RM0.15
- USED COOKING OIL RM1.00
- 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)

"Reengineering Sustainability"

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RECYCLER OF THE MONTH

MARCH 2021

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Congratulations from SCO!

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SWM ENVIRONMENT

Earth MONTH AWARENESS 2021
"OUR PLANET, OUR RESPONSIBILITY"

Sustainable Campus Office
Universiti Tun Hussein Onn Malaysia
#SCOgogreen #UTHMgreencampus

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
- Tin aluminium
- Tin besi
- Besi buruk
- Logam premium
- Buku & Majalah
- Kotak kadbod
- Kertas putih
- Kertas campur
- Suratkhabar
- Kotak minuman
- Plastik campur
- Plastik keras
- Polisterin
- Pakaian terpakai
- Kaca
- Minyak masak terpakai

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www.scu.uthm.edu.my

Pay by Weight

reengineering sustainability

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.
Performance Criteria 1: Site Selection		
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
Performance Criteria 2: Urban Form		
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
Performance Criteria 3: Urban Greenery and Environmental Quality		
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.
Performance Criteria 10: Infrastructure Provision		
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
Performance Criteria 11: Waste		
UI 2-1	Construction Waste Management	72
UI 2-2	Industrial Waste Management	73
UI 2-3	Municipal Solid Waste (MSW) Management	75
Performance Criteria 12: Energy		
UI 3-1	Energy Optimisation	76
UI 3-2	Renewable Energy	77
UI 3-3	Site-Wide District Cooling System	78
Performance Criteria 13: Water Management		
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.
Performance Criteria 4: Reduction Use of Private Motorised Transport on Urban Road Network		
UT 1-1	Classified Traffic Volume Urban Road Network	48
UT 1-2	Vehicle-km of Travel by Modes	50
Performance Criteria 5: Increase in Public Transport		
UT 2-1	Public Transport Ridership	52
UT 2-2	Public Transport System Improvement and Coverage	54
Performance Criteria 6: Mode Shift from Private to Public Transport and Non-Motorised Transport		
UT 3-1	Modal Share of Private, Public, and Non-Motorised Transport	56
Performance Criteria 7: Use of Low Carbon Transport		
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
Performance Criteria 8: Improvement to Level of Service of Road Links and Junctions		
5-1	Performance of Road Links and Junctions	61
5-2	Average Link Speeds and Journey Speeds	63
Performance Criteria 9: Utilisation of Transit-Oriented-Development (TOD) Approach		
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

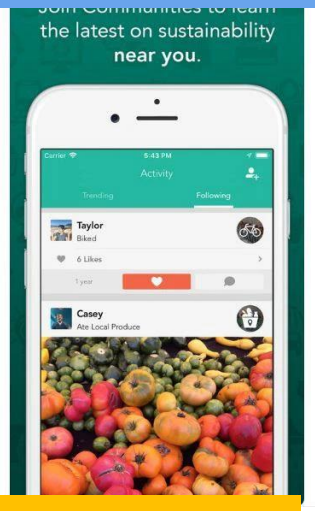
No	Performance Criteria & Sub Criteria	Page No.
Performance Criteria 14: Sustainable Energy Management System		
B 1-1	Energy Management System	81
B 1-2	Facility Management	82
Performance Criteria 15: Low Carbon Buildings		
B 2-1	Passive & Active Design	83
B 2-2	Operational Energy Consumption	85
B 2-3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

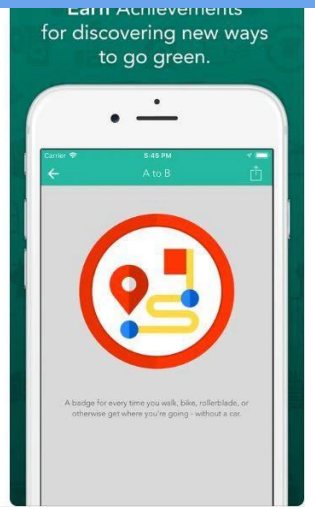
Table 3.4: Performance Criteria and Sub-criteria for Building

07

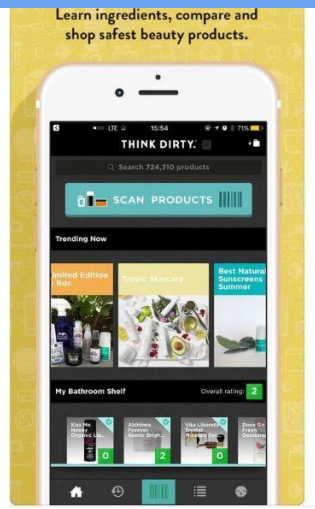
INDIVIDUAL COMMITMENT

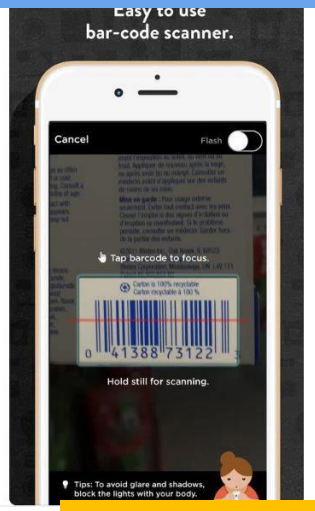
Sustainable application

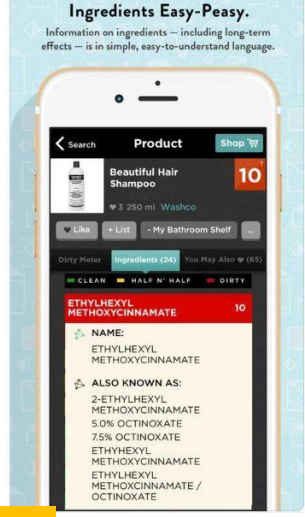




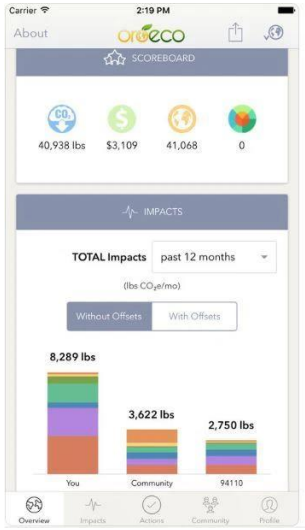
JouleBug Application

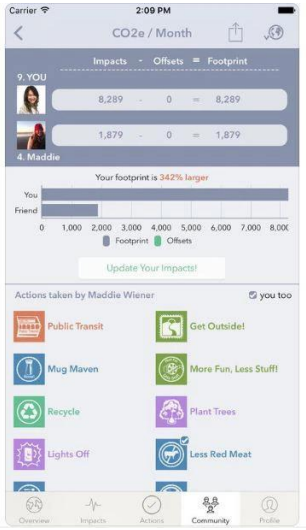


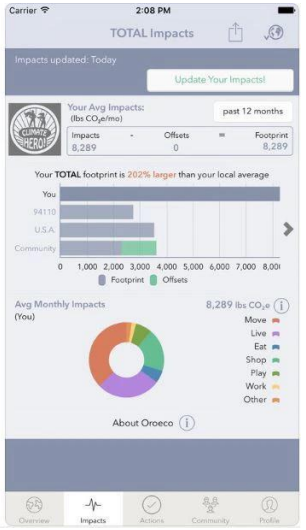




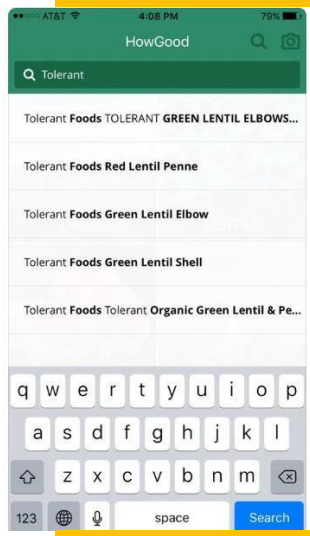
Think Dirty Application

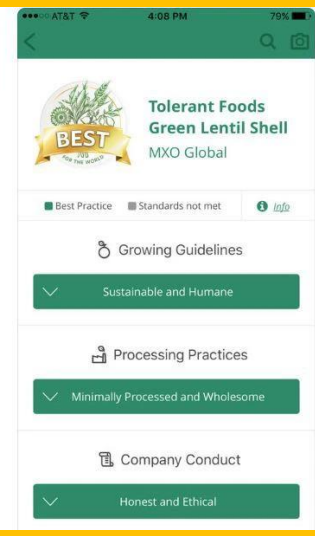






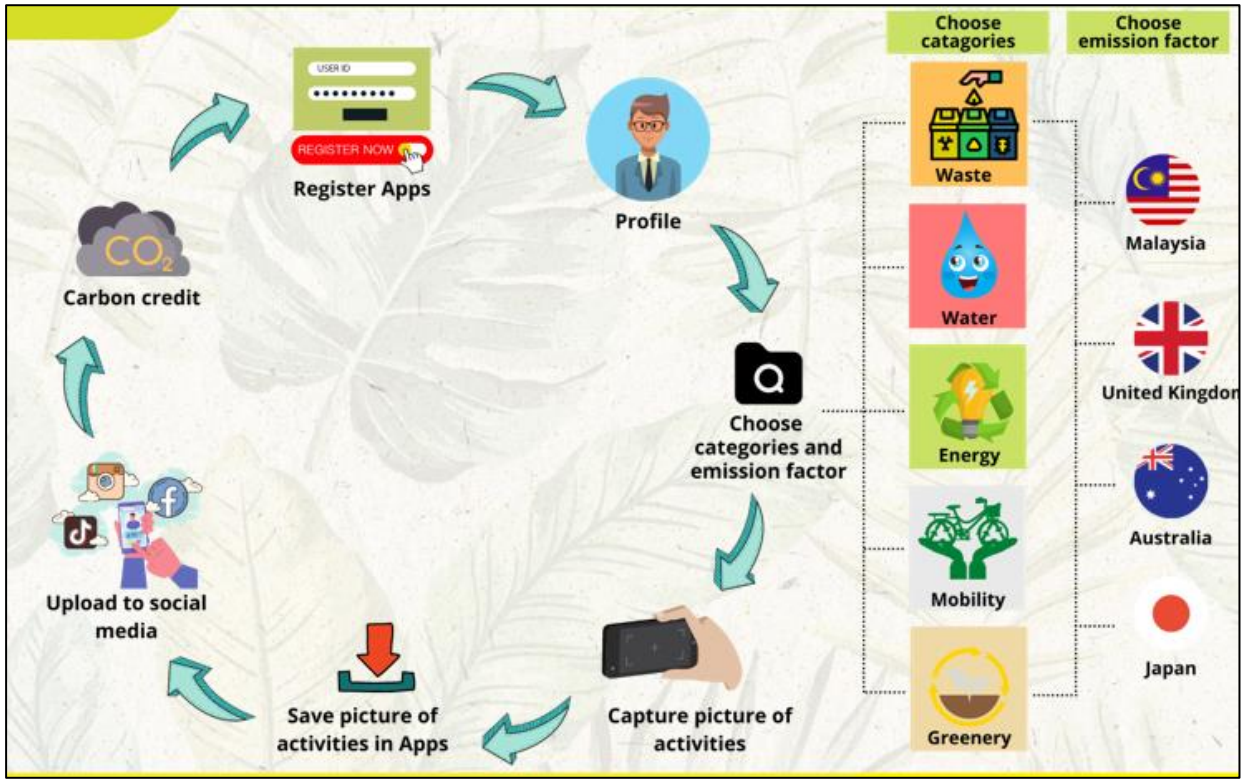
Oroeco Application



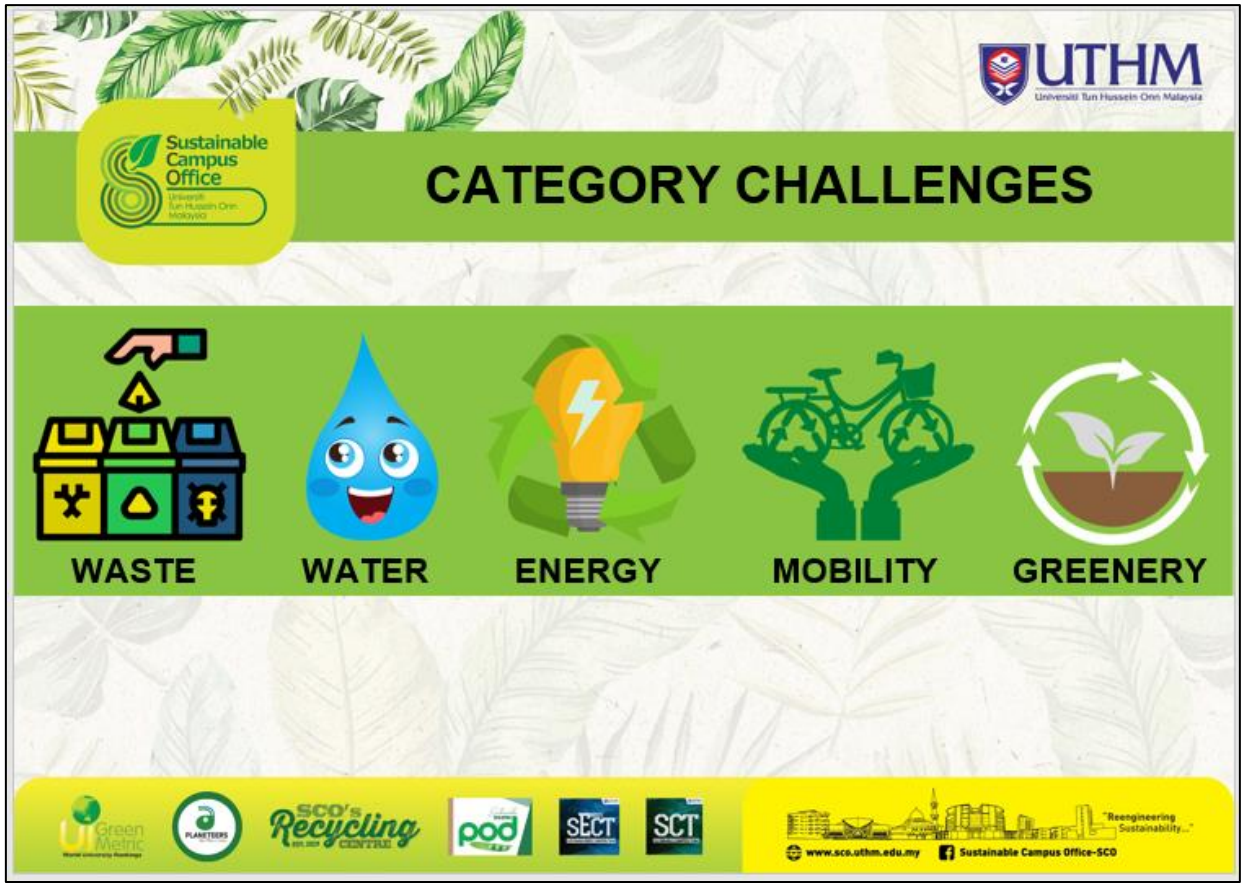


HowGood Application

Sustainable application



Apps interface



Sustainable application

Campus Office
Universiti Tun Hussein Onn Malaysia

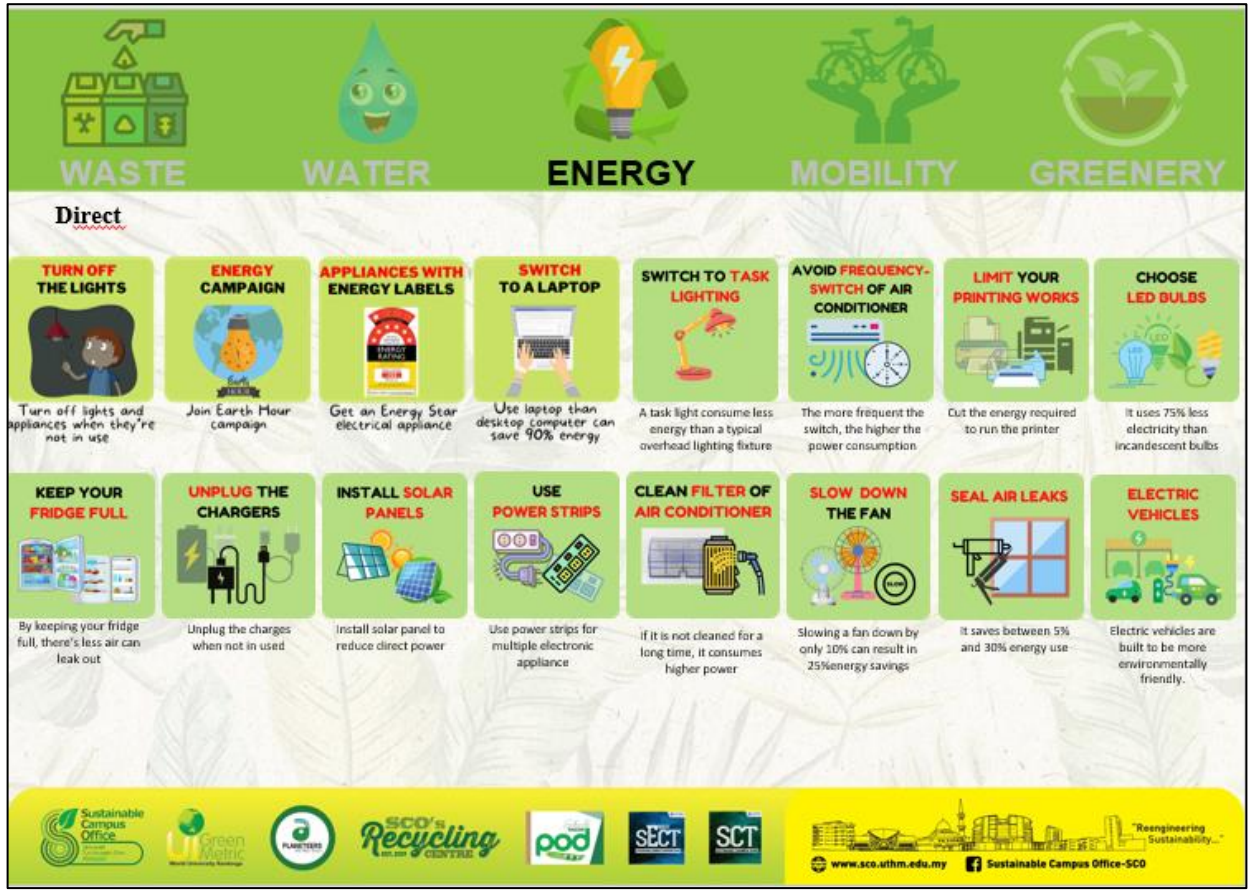
CARBON EMISSION FACTOR ACCORDING TO COUNTRY

CARBON EMISSION	JAPAN	MALAYSIA	UNITED KINGDOM	AUSTRALIA
Waste	1.114 kg CO_2e/tonne (MINISTRY OF ENVIRONMENT, JAPAN)	1. Recycle = 586.531 kg CO_2e/tonne (DEFRA, 2018) 2. Composting = 8.951 kg CO_2e/tonne (DEFRA, 2021)	1. Organic: Food and drink waste = 626.875 kg CO_2e/tonne (DEFRA, 2021) 2. Landscape waste/garden waste = 578.959 kg CO_2e/tonne (DEFRA, 2021) 3. Electrical waste = 8.902 kg CO_2e/tonne (DEFRA, 2021) 4. Metal = 8.902 kg CO_2e/tonne (DEFRA, 2021) 5. Plastic = 8.902 kg CO_2e/tonne (DEFRA, 2021) 6. Paper and board = 1401.804 kg CO_2e/tonne (DEFRA, 2021)	1. Food waste = 2.1 tonne CO_2/e (NGA, 2021) 2. Paper and cardboard = 3.3 tonne CO_2/e (NGA, 2021) 3. Garden and green = 1.6 tonne CO_2/e (NGA, 2021) 4. Inert waste (metal, plastic, glass) = 0 (NGA, 2021) 5. Rubber and leather = 3.3 tonne CO_2/e (NGA, 2021)
Water	0.59 kg CO_2e/m3 (MDPI)	0.419 kg CO_2/m^3 (CCM Study, UNEP, 2012)	1. Water supply = 0.148 kg CO_2e/m^3 (DEFRA, 2021)	
Energy	0.506 kg CO_2e/kWh (Climate Transparency)	694. CO_2e/kWh (MESTECC)	1. kg CO_2e per unit = 0.21233 kg CO_2e/kWh (DEFRA, 2021) 2. kg CO_2e of CO_2 per unit = 0.21016 kg CO_2e/kWh (DEFRA, 2021)	
Mobility	72.0 ktCO_2e (IPCC, 2006)	1. Car = 0.18368 kg CO_2e/km (DEFRA, 2018) 2. Motorcycle = 0.11529 kg CO_2e/km (DEFRA, 2018) 3. Bus = 0.791 kg CO_2e/km (LCMB, 2017)		1. Passenger car = 0.03021 kg CO_2/mile (EPA, 2021) 2. Motorcycle = 0.189 kg CO_2/vehicle-mile (EPA, 2021) 3. Bus = 0.056 kg CO_2/passenger-mile (EPA, 2021)
Greenery	21.4 Mt Co_2e (WRI)	1. Forest = 14,400 kg CO_2e/ha/year (NC3) 2. Landscape = 2,000 kg CO_2e/ha/year (NC3) 3. Water Bodies = 2,560 kg CO_2e/ha/year (NC3) 4. Trees = 30 kg CO_2e/tree/year (NC3)		

Sustainable application

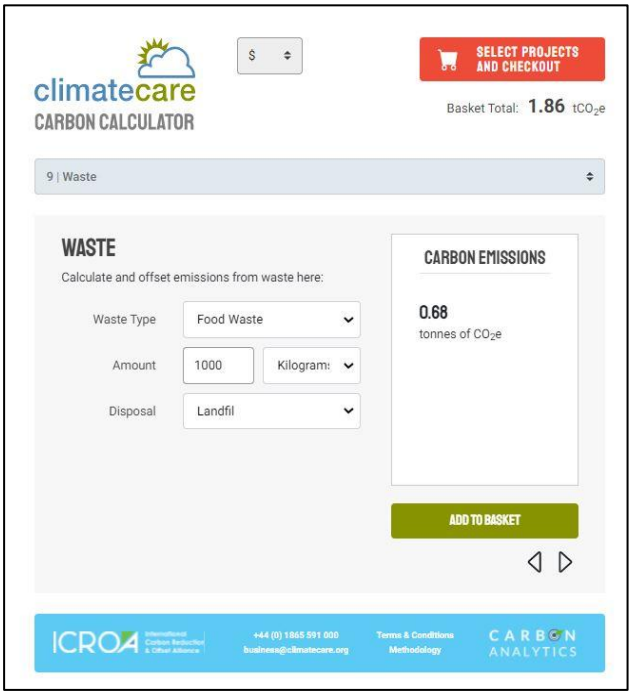
Sustainable application

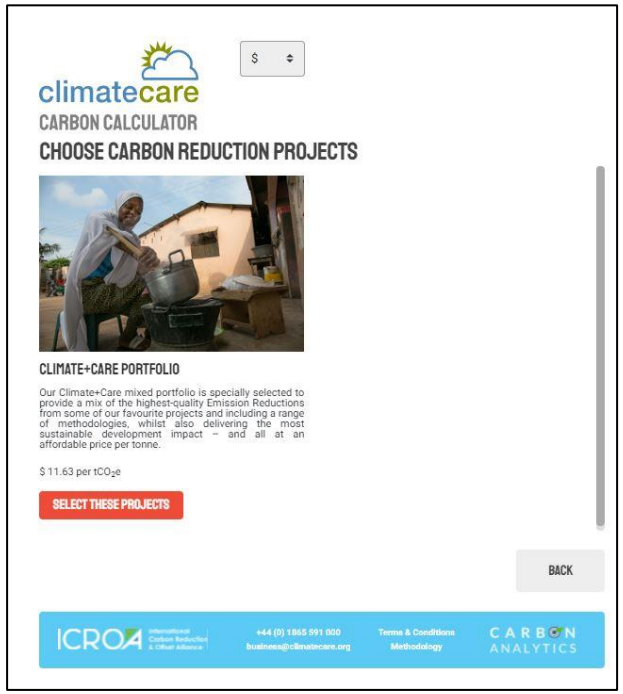
Sustainable application

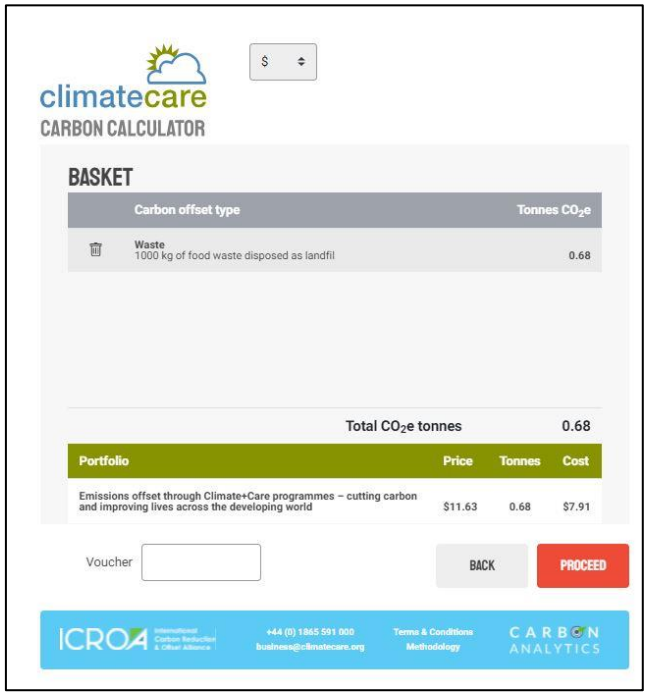


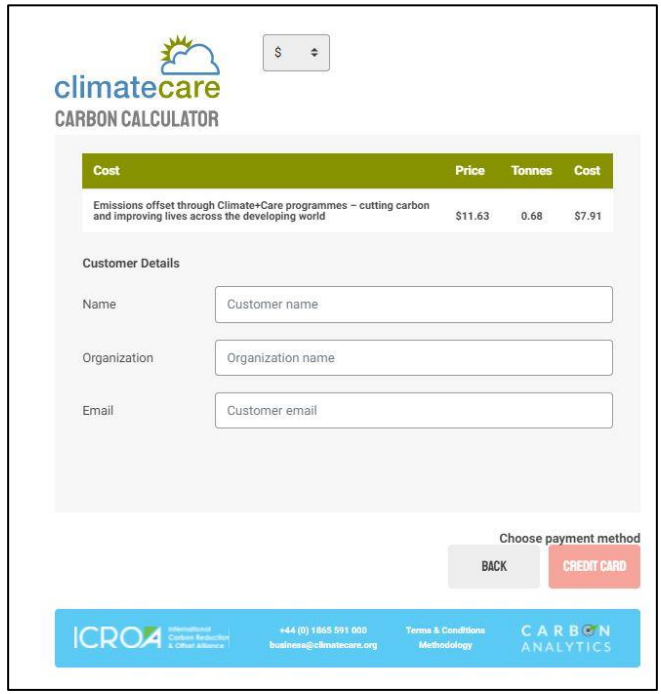
Sustainable application

Carbon calculator website



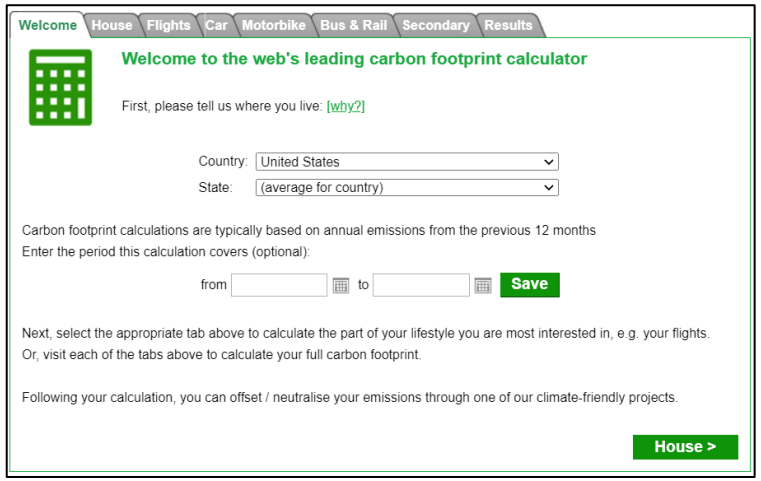


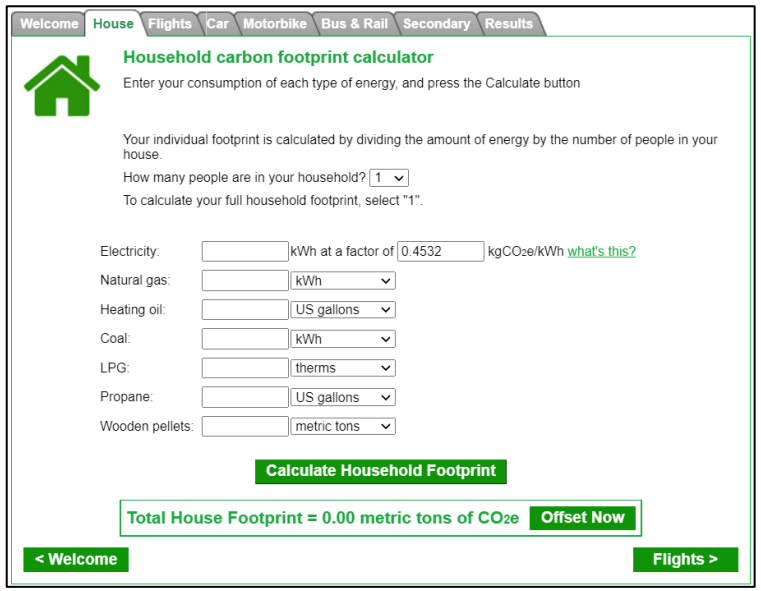


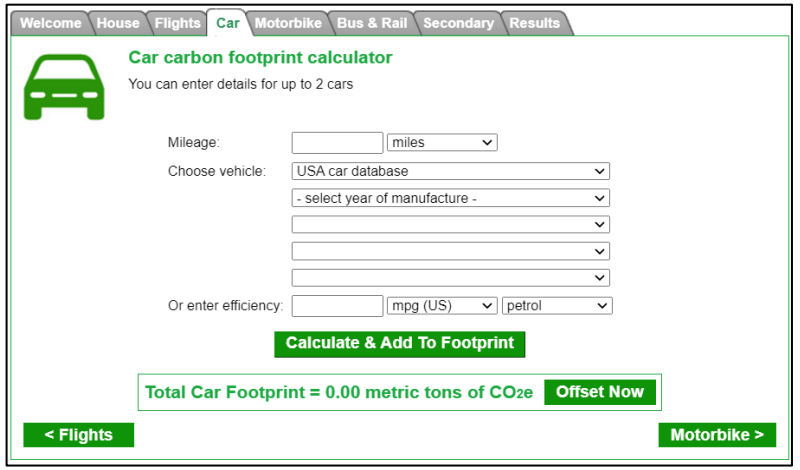


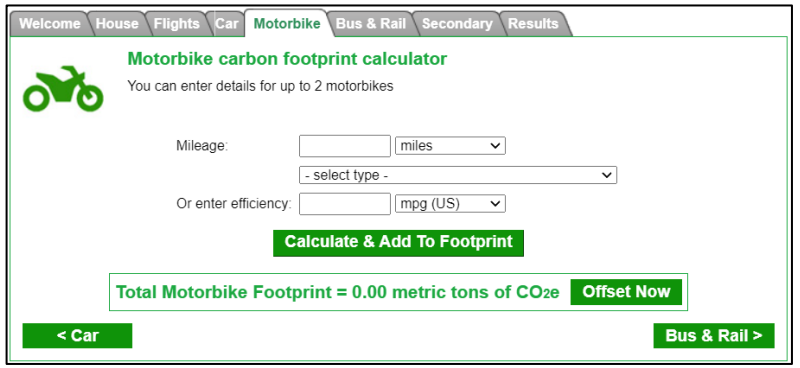
https://www.climatecare.org/calculator/

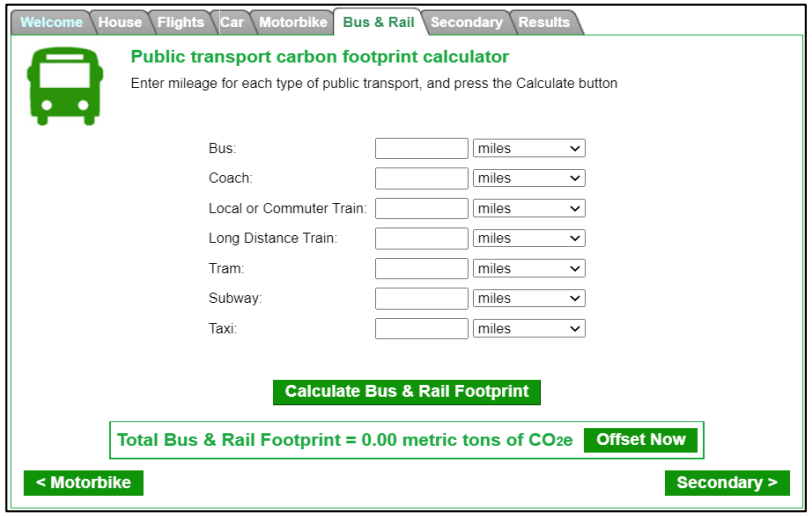
Carbon calculator website

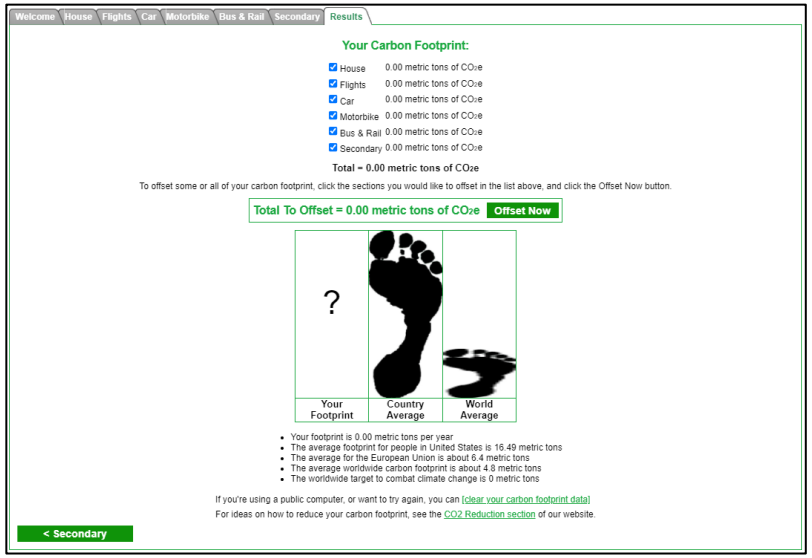






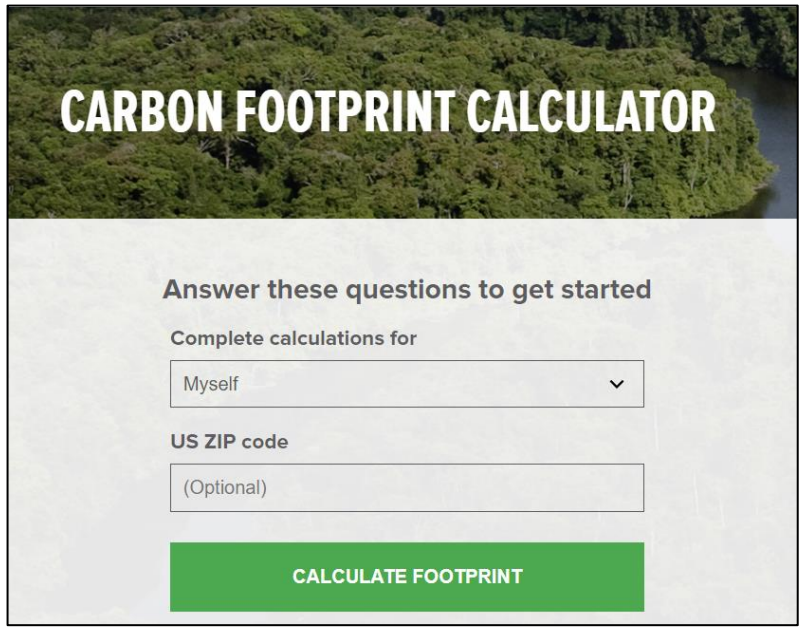


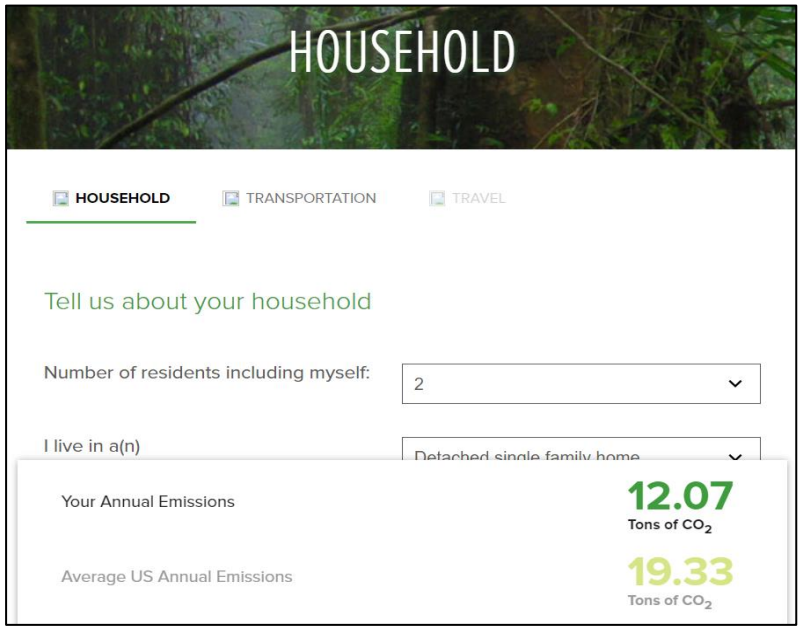


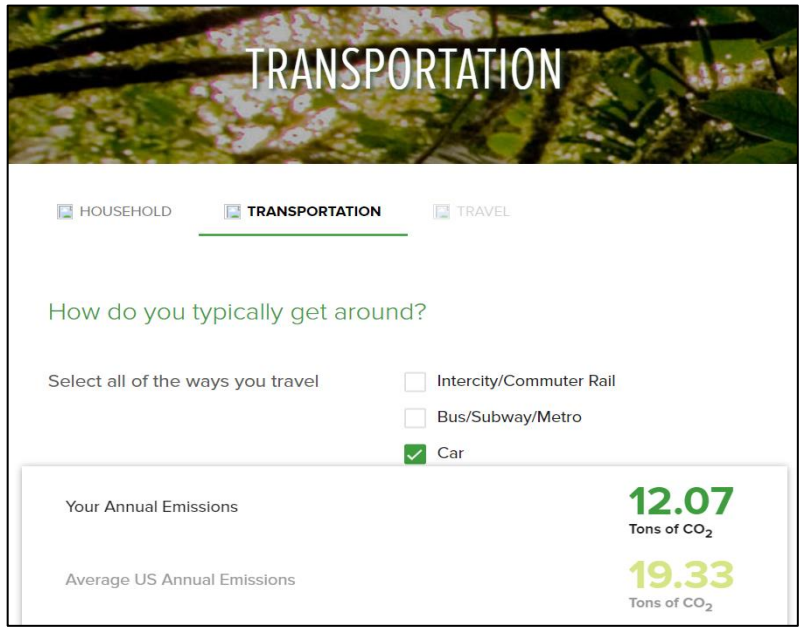


https://www.carbonfootprint.com/calculator.aspx

Carbon calculator website





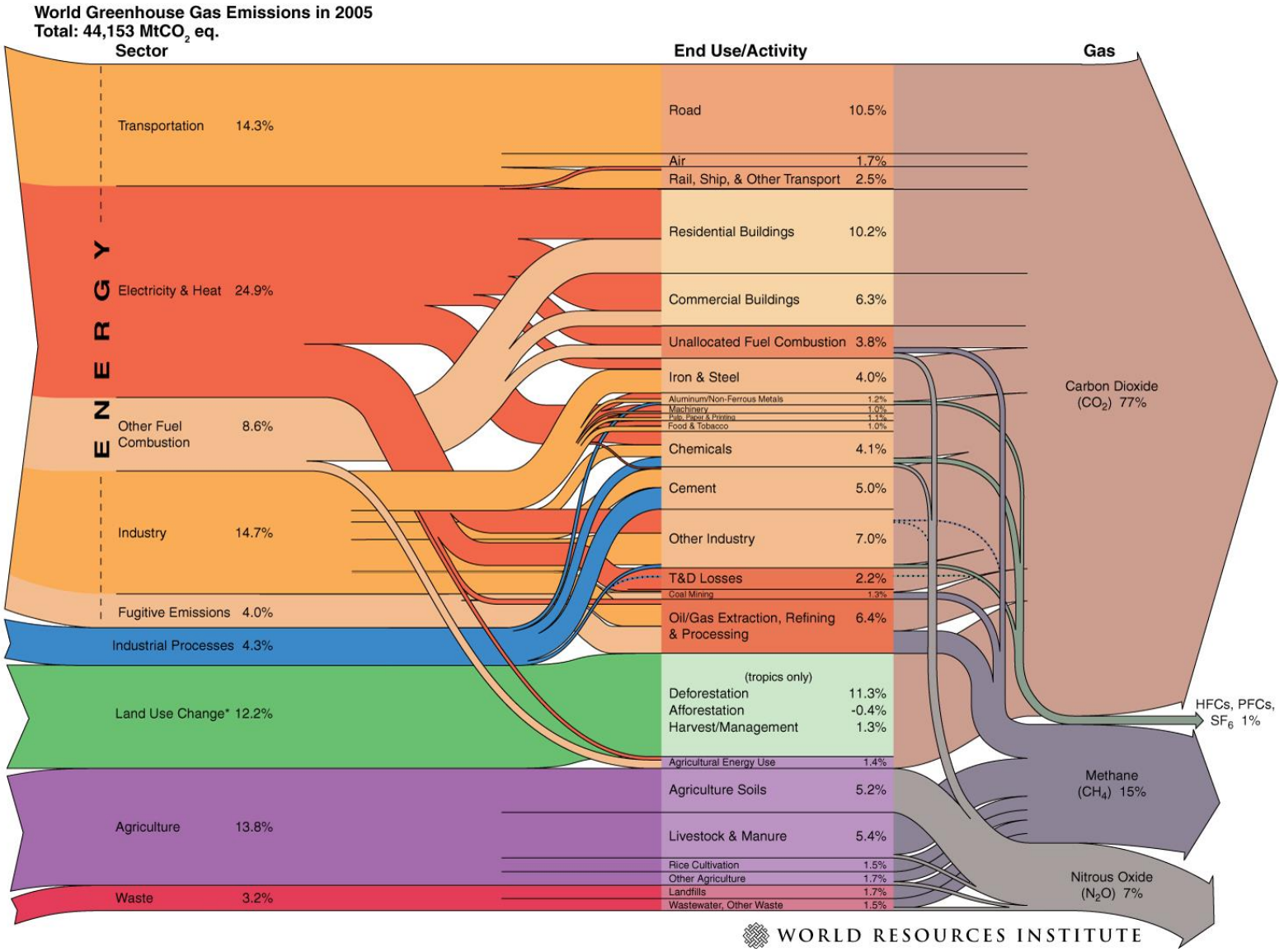


https://www.conservation.org/carbon-footprint-calculator#/

08

MYRESEARCH

World GHG emission in 2005



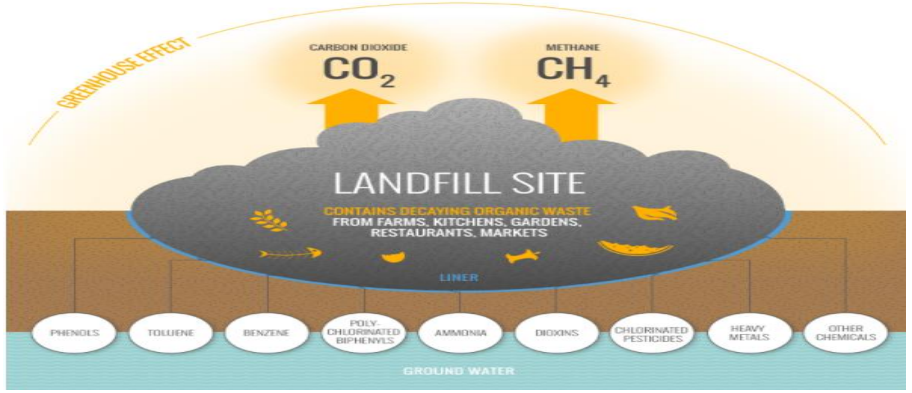
https://www.wri.org/data/world-greenhouse-gas-emissions-2005

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

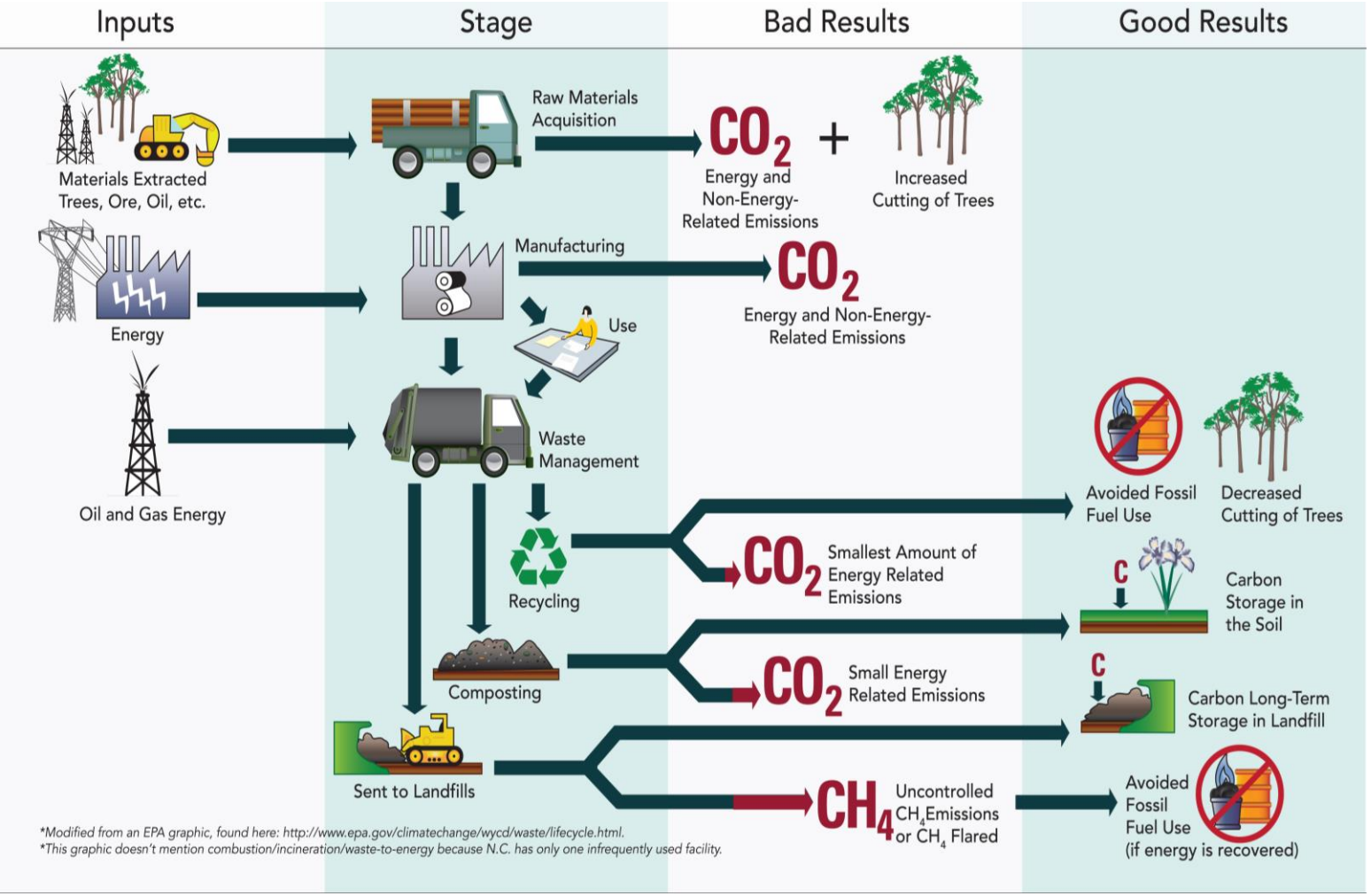
- Methane has **21 times** the warming potential of carbon dioxide
- **90.9%** of methane emissions in Malaysia were generated from landfill



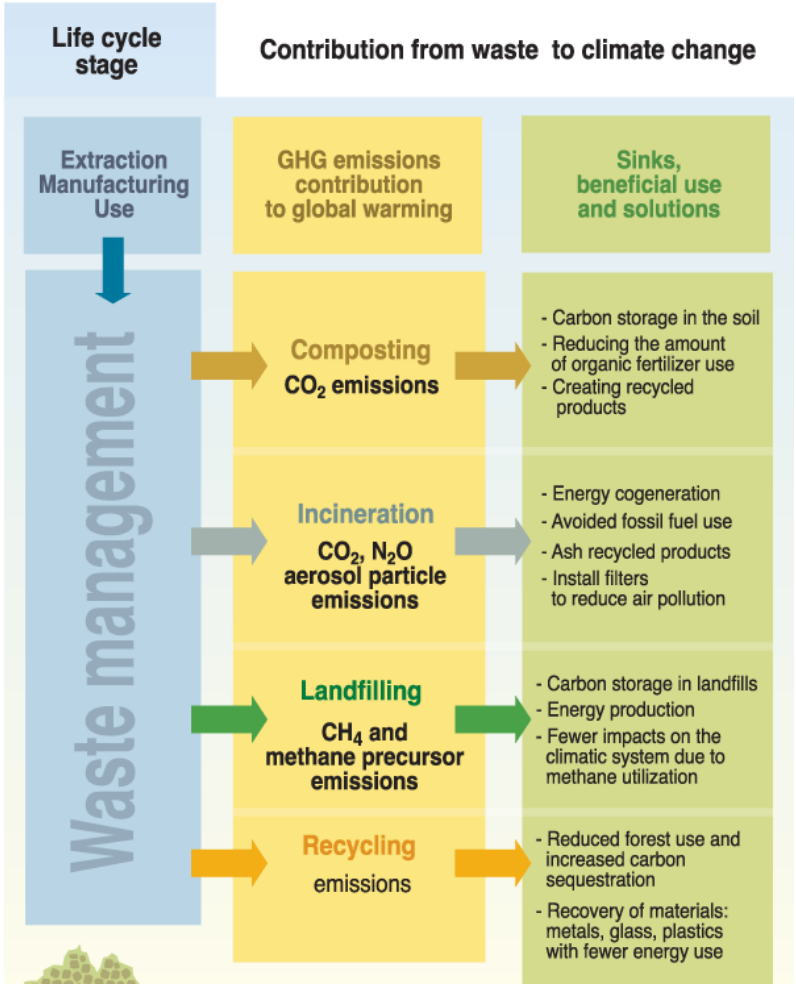
2. The emission of nitrous oxide from our solid waste combustion facilities

- Nitrous oxide has **310 times** worse than CO_2 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



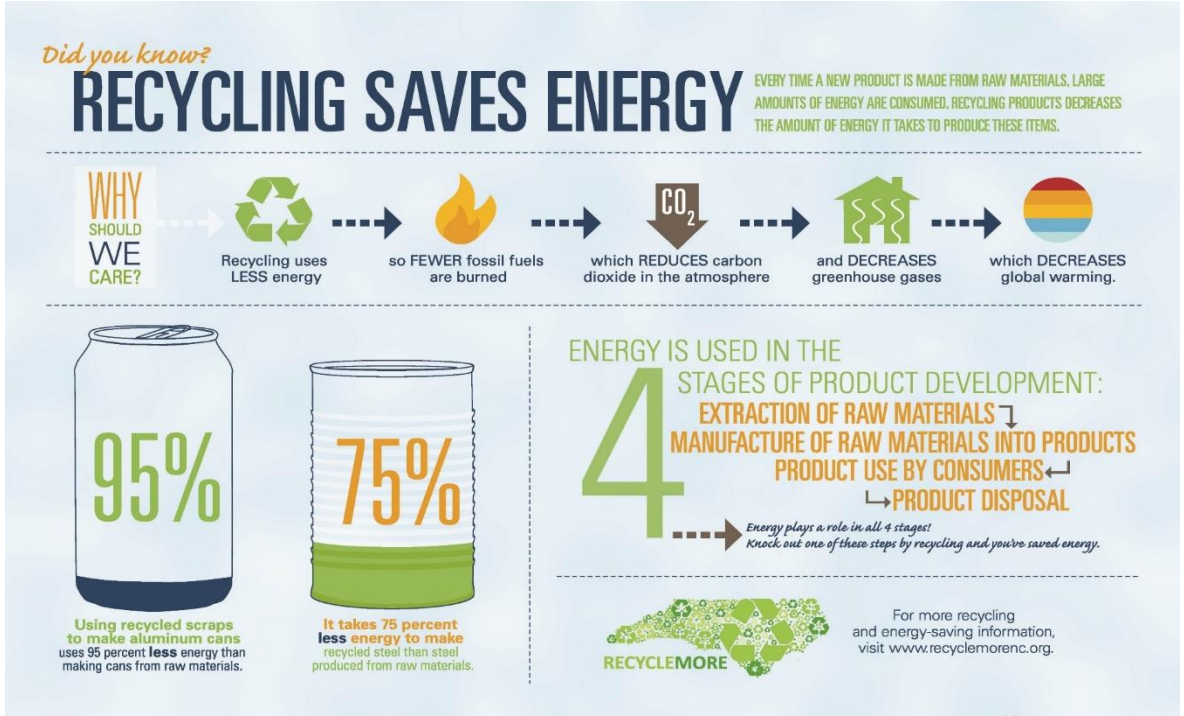
https://kingcounty.gov/depts/dnrp/solid-waste/programs/climate/climate-change-waste-management.aspx

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.



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_2)
- methane (CH_4)
- nitrous oxide (N_2O)
- fluorinated gases

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

COMPOSTING **DECREASES** THE GREENHOUSE GAS, **METHANE**

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_2**

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.recyclemorenc.org.

RECYCLEMORE

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-compaction 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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