

臺南大學通識中心-環境與生態

Climate Change & COP26

吳貞宜
2022/12/15



空間分布

推估時間比較

情境比較

單情境時序變化

多情境時序變化

資料說明

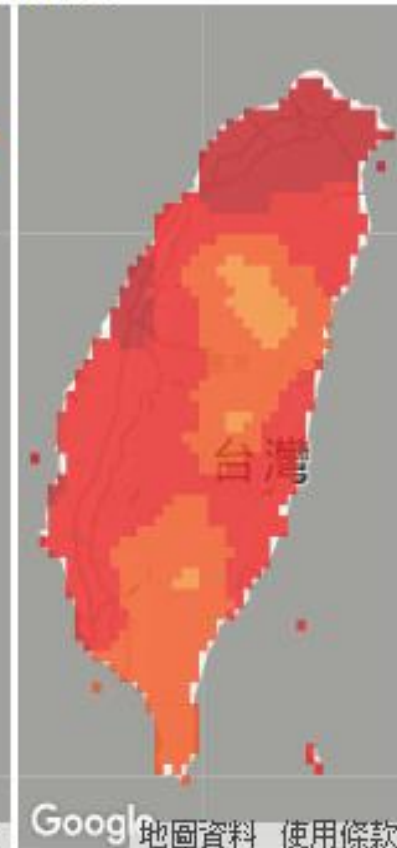
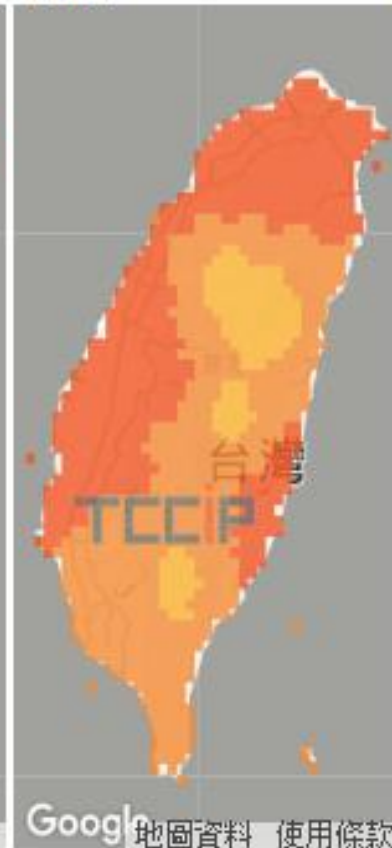
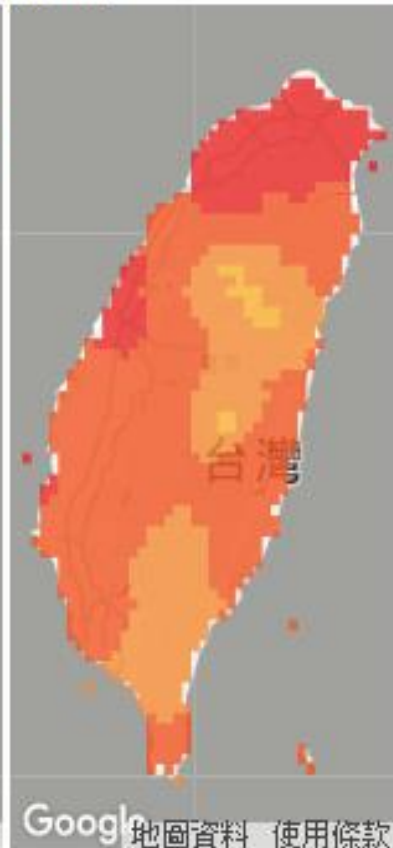
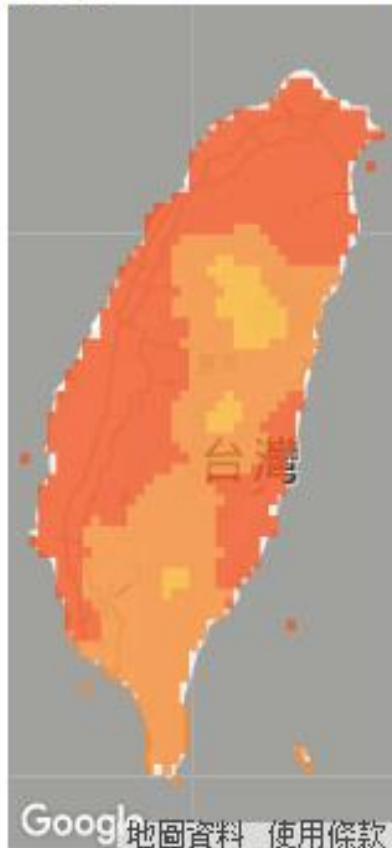
2021-2040模式平均年溫度改變量

RCP2.6

RCP4.5

RCP6.0

RCP8.5

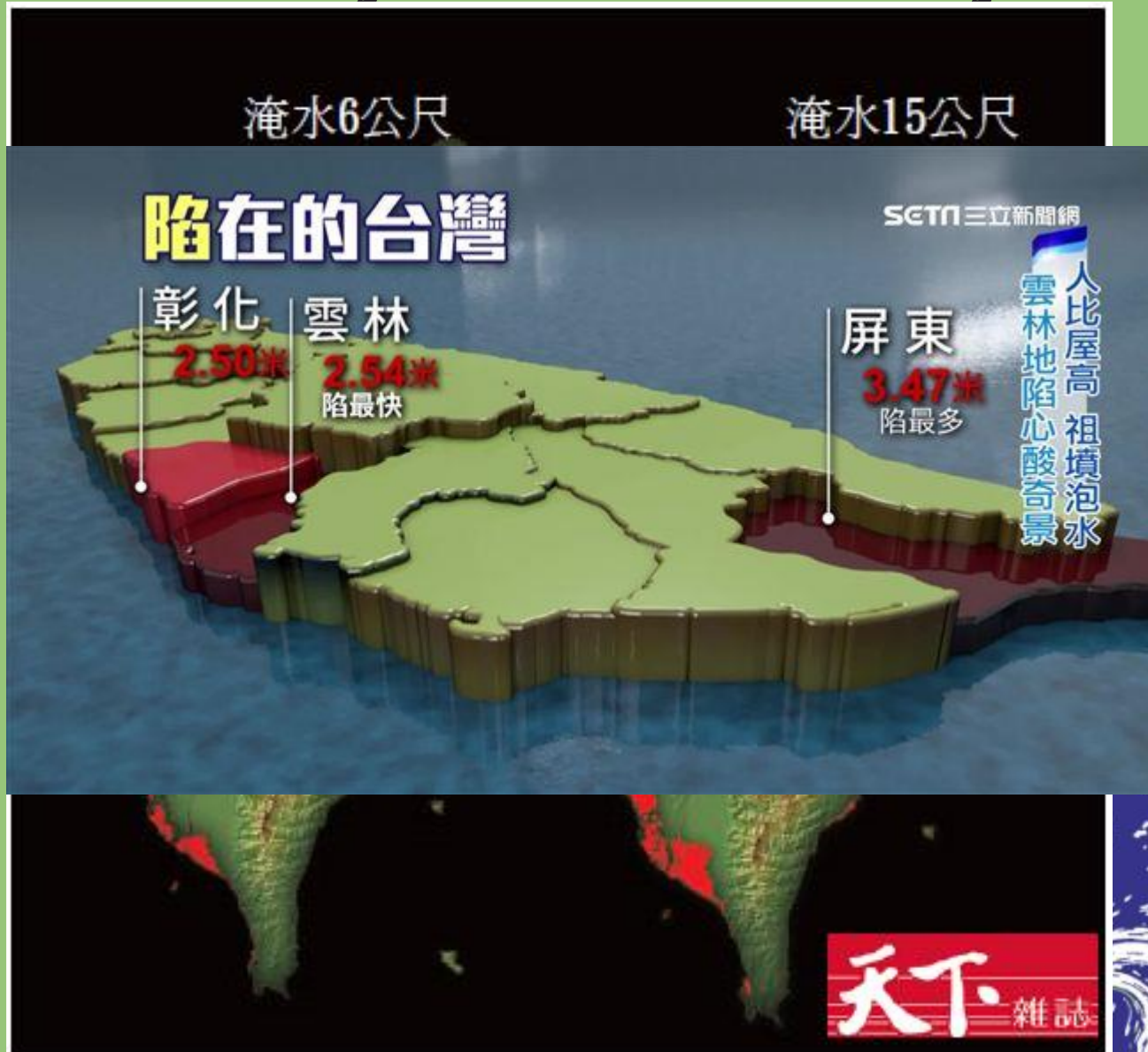


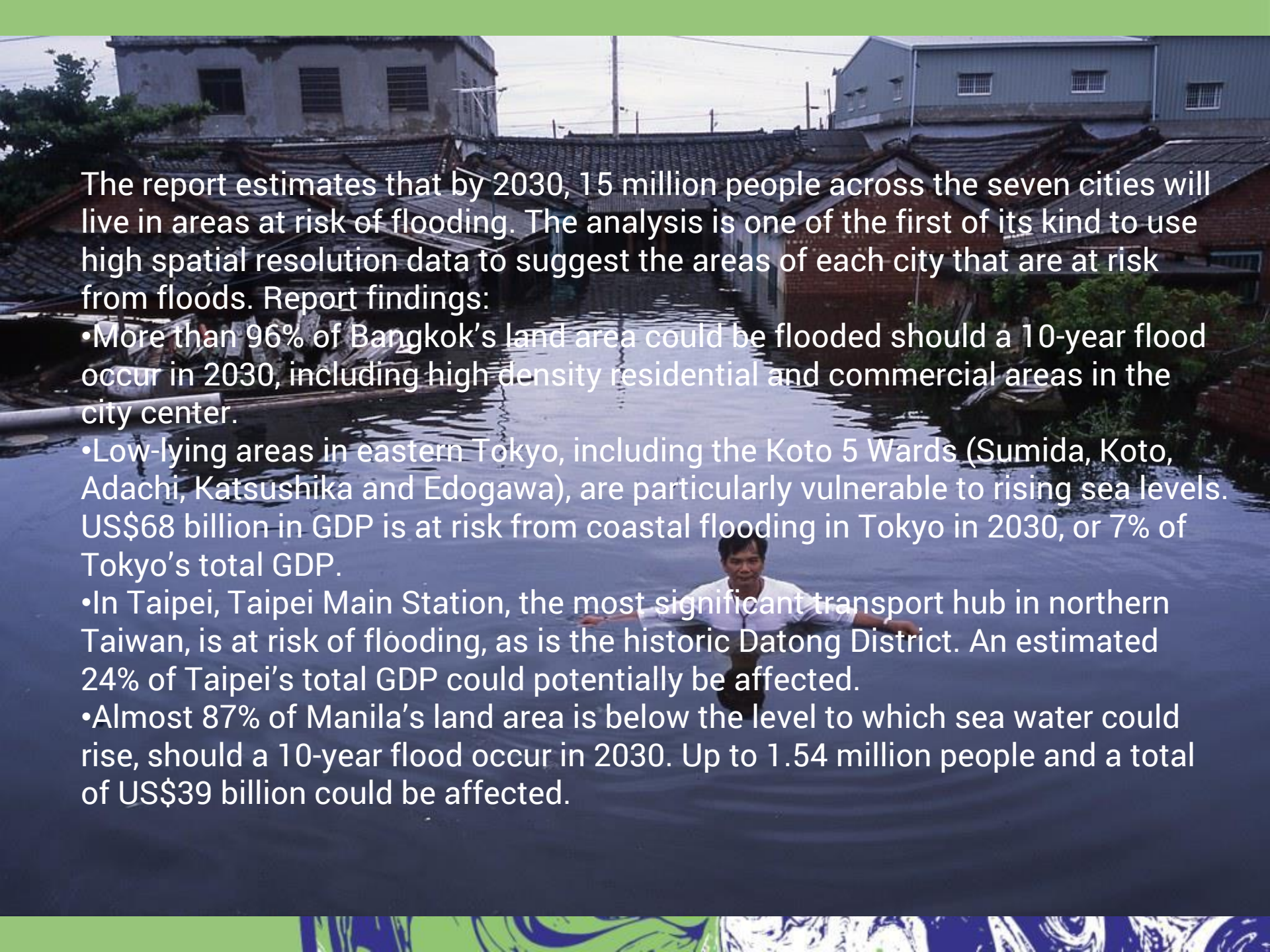
不透明度 0.8

RCP 8.5 refers to the concentration of carbon that delivers global warming at an average of 8.5 watts per square meter across the planet.

Taiwan sea level rising map

6 m flood 15m flood





The report estimates that by 2030, 15 million people across the seven cities will live in areas at risk of flooding. The analysis is one of the first of its kind to use high spatial resolution data to suggest the areas of each city that are at risk from floods. Report findings:

- More than 96% of Bangkok's land area could be flooded should a 10-year flood occur in 2030, including high density residential and commercial areas in the city center.
- Low-lying areas in eastern Tokyo, including the Koto 5 Wards (Sumida, Koto, Adachi, Katsushika and Edogawa), are particularly vulnerable to rising sea levels. US\$68 billion in GDP is at risk from coastal flooding in Tokyo in 2030, or 7% of Tokyo's total GDP.
- In Taipei, Taipei Main Station, the most significant transport hub in northern Taiwan, is at risk of flooding, as is the historic Datong District. An estimated 24% of Taipei's total GDP could potentially be affected.
- Almost 87% of Manila's land area is below the level to which sea water could rise, should a 10-year flood occur in 2030. Up to 1.54 million people and a total of US\$39 billion could be affected.

Global temperature change (relative to pre-industrial)

0°C 1°C 2°C 3°C 4°C 5°C

Food

Falling crop yields in many areas, particularly developing regions

Possible rising yields in some high latitude regions

Falling yields in many developed regions

Water

Small mountain glaciers disappear – water supplies threatened in several areas

Significant decreases in water availability in many areas, including Mediterranean and Southern Africa

Sea level rise threatens major cities

Ecosystems

Extensive Damage to Coral Reefs

Rising number of species face extinction

Extreme Weather Events

Rising intensity of storms, forest fires, droughts, flooding and heat waves

Risk of Abrupt and Major Irreversible Changes

Increasing risk of dangerous feedbacks and abrupt, large-scale shifts in the climate system

10.1.2
史坦
報告



The impacts of failure could be devastating; difference between 1.5°C and 2°C potentially very strong

	1.5°C	2°C	2°C vs 1.5°C
Extreme Heat ¹ (Proportion of global pop. exposed to severe heat at least once every 5 years)	14%	37%	2.6x worse
Number of sea-ice-free Arctic summers ²	At least 1 after ~100 years of stabilised warming	At least 1 after ~10 years of stabilised warming	10x worse
Bioclimatic range loss of >50% ³	Vertebrate species: 4% Plant species: 8% Insect species: 6%	Vertebrate species: 8% Plant species: 16% Insect species: 18%	Vertebrate species: 2x worse Plant species: 2x worse Insect species: 3x worse

Differences between 1.5°C and 2°C are major. Differences from 2°C to 2.5°C, and then to 3°C likely still bigger. Current paths likely to lead to 3°C or more, with real risks of still higher temperatures.

Immense risks to lives and livelihoods across the world. Hundreds of millions, or billions, likely to have to move, with possibility of widespread, severe and extended conflict.

What country have you seen in the conference?



Economics must get more serious in five key areas for understanding and policy on climate change

- i. **Urgency and scale.** *Time* is critical; delay is dangerous. Need a “public economics as if time matters” (see Stern, 2018).
- ii. **Fundamental uncertainty** and **extreme risk**, including possible large-scale, indeed, for many, existential consequences.
- iii. **Systemic and structural change and dynamics**, often exhibiting increasing returns to scale in production, discovery and networks (potentially also in endogenously determined, beliefs and preferences, see e.g. Besley & Persson, 2020).
- iv. **Scale and number of market failures** (beyond that of the GHG externality); and crucial markets are **absent**. Tackling these market failures essential to public policy, although abilities to do so have limitations.
- v. **Values** and **discounting** that shape policy decisions require explicit analysis and discussion. Crucial issues within and across generations.

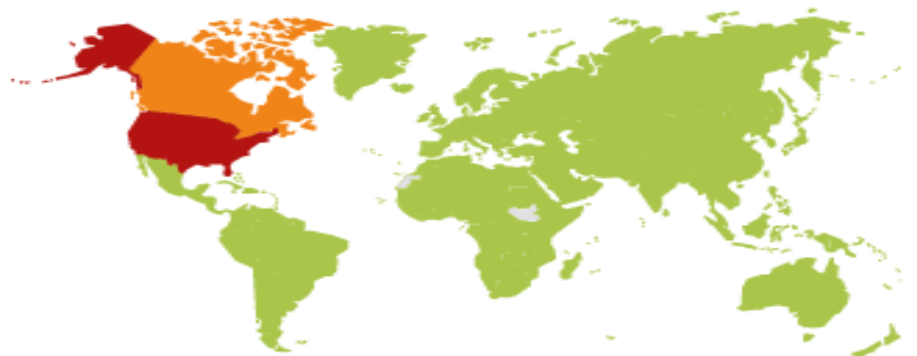
Arguments and analytics are set out in Stern & Stiglitz, 2022, and Stern, 2022.

Rapid change requires some shared understanding and coordination of action, driven by analytics, principles, evidence and leadership.

Economics has not only been slow to respond, it has also, in large measure, failed to grapple effectively with many of the core issues.

TODAY IN CHEMISTRY HISTORY

16TH FEBRUARY – THE KYOTO PROTOCOL (2005)



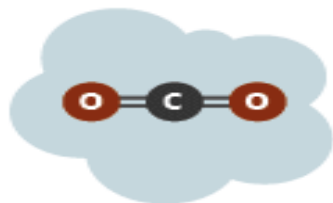
192
COUNTRIES

- signed and ratified
- ratified but withdrawn
- signed but not ratified

TARGET
↓ **5.2%**
by 2012 relative to 1990



METHANE



CARBON DIOXIDE



NITROUS OXIDE

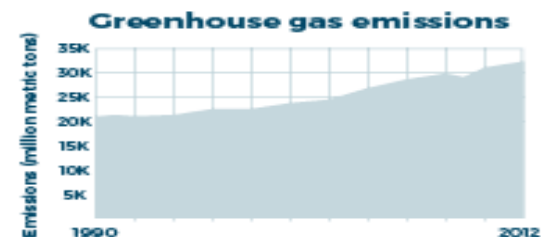
GREENHOUSE GASES

HYDROFLUOROCARBONS

PERFLUOROCARBONS

SULFUR HEXAFLUORIDE

The Kyoto Protocol is an international treaty to reduce the emission of six greenhouse gases. 192 countries are party to the protocol, but only 38 had binding targets for the first period (2008–2012). These 38 countries met their target collectively – but an absence of binding targets for developing nations such as China and India meant that worldwide greenhouse gas emissions continued to rise.





www.youtube.com/upscgeneralstudies



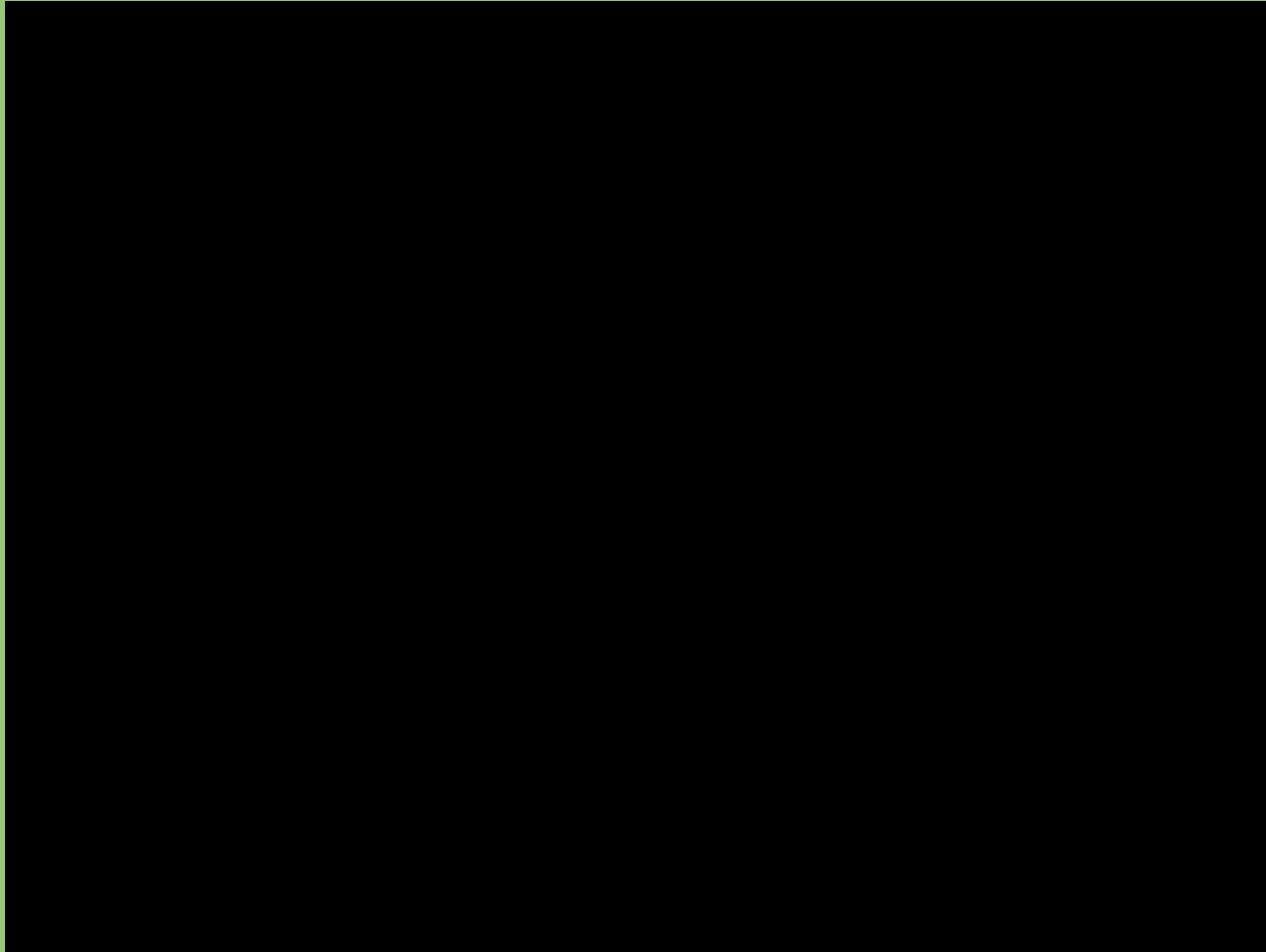
Accord

Non-binding
agreement

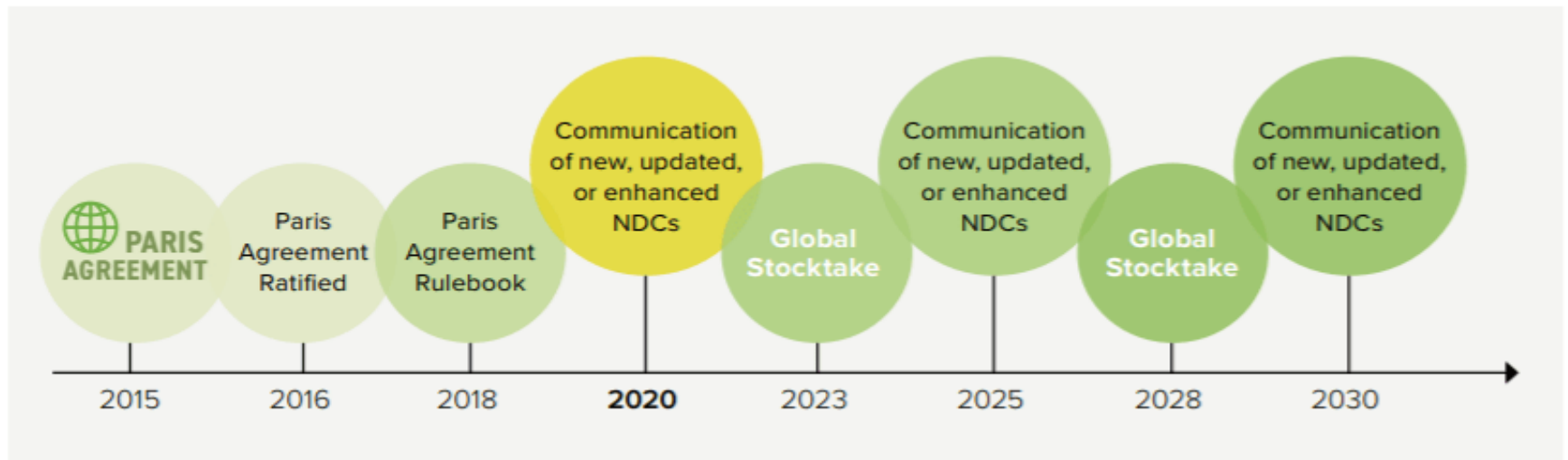
- 1. Deep international emission cuts are needed in global temperature to under two degree Celsius**
- 2. Developed countries agree to set target for reductions in their GHG emission by 2020**
- 3. Developing countries agree to pursue nationally appropriate mitigation strategies to slow the growth of the emissions , but not committed to reduce their carbon output**
- 4. Mobilization of financial resources**
- 5. Low emitting countries should be incentivized to continue the same**
- 6. Agreement that developed countries would raise funds of \$ 30 billion from 2010-2012 of new and additional resources**
- 7. Goal for the world to raise \$ 100 billion per year by 2020**

遠見雜誌 Short Film

- 巴黎協議



PARIS CLIMATE AGREEMENT



Nationally Determined Contributions (NDCs)

PARIS CLIMATE AGREEMENT

Historical document that legally binds the whole World to participate in climate change fight.



Adopted the Agreement

officially recognizing human influence on climate



2

Rich countries will provide minimum of \$ to developing ones for climate change adaptation by 2020



6

Will come into force by 8

If signed by countries covering of global emissions



3

Every 5 years countries shall revise their emissions reduction targets and measures

Goal

Holding the increase in the global average temperature well below

4

°C

Pursue efforts to limit the temperature increase to

5

°C



9

Climate

The balance between emissions and sinks should be reached in the second half of XXI century



6

For the first time ever the Agreement defines climate loss and damage terms but liability and compensation are not mentioned



10

The Agreement urges to speed up clean tech development and international technology transfer



7

Role of

The Agreement binds saving and increasing forest area in order to capture GHGs from the atmosphere

Role Play

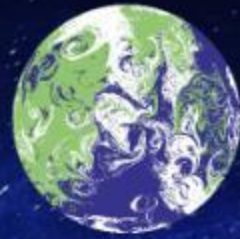
- 請試著轉換成文章內的角色，配合適當的宣導及情緒，念出對話。
- <http://www.gcaa.org.tw/post.php?aid=459>

聽說...
巴黎氣候大會
正式通過
「巴黎協定」
了！



但！這干我們台灣
什麼事呢？

COP26



**TOGETHER
FOR OUR
PLANET**

26th Conference of the Parties

Our Climate Our Future

twinkl

COP 26 – What?

UNFCCC全名為The United Nations Framework Convention on Climate Change，中文翻譯為「聯合國氣候變遷綱要公約」或「聯合國氣候變化綱要公約」，是聯合國設立的「政府間氣候變化綱要公約談判委員會」。歷經多次會議討論後，在1992年通過、1994年生效的公約，目前共有**197**國成為締約方。

COP的全名是Conference of the Parties也就是締約國會議，在氣候變遷這項議題上，所謂的締約國 / 締約方指的便是簽署UNFCCC的國家，而COP每年會召集簽署國來討論如何共同應對氣候變遷。

COP26 – Our Climate Our Future



Our planet is in crisis and the world **must** come together to find solutions.

COP26 – Who?

World Leaders

Leaders of some of the world's most wealthy countries

除了世界各國的領導人、相關的政府機構官員、談判代表，COP26也會有來自民間的企業、媒體、非營利組織、非政府組織等代表參與，預估會有2.5萬人參與。然而，由於許多國家尚未取得充足的疫苗、疫情也未見趨緩，這將增加他們參與COP26的成本、甚至考量風險無法參與。因此，國際間許多民間組織呼籲英國政府再次延後舉辦COP26，以確保與會人士的多元性。



Negotiators



世界領導人顧問團將參加討論，討論各國家可以做些什麼來減少溫室氣體排放，提出INDC，並讓該國人民為氣候變化的影響做好準備。

COP26 – Our Climate Our Future



在這之前，共有幾次舉世聞名的決議，包含1997年在日本京都舉辦的COP3，會議最後通過了《京都議定書》（ Kyoto Protocol ），針對包括二氧化碳在內的氟氯碳化物等六種溫室氣體，定出具體減量目標。

2015年在法國巴黎舉辦的COP21，各國通過了《巴黎協定》（ Paris Agreement ）來取代《京都議定書》。《巴黎協定》內容規定締約國致力推動減碳政策，目標是本世紀末全球氣溫升幅控制不超過攝氏2度，最理想是控制在1.5度以內。此外，所有簽署《巴黎協定》的國家須提出**國家自主貢獻（ Nationally Determined Contributions , NDCs ）**的承諾，並每五年檢討各國對減排的貢獻；同時透過提供氣候融資，協助開發中國家減緩與調適氣候變遷帶來的衝擊。



COP26 – When?

1st–12th November 2021

COP26, now six years after the Paris Agreement, is a time for parties to assess progress made so far and agree on the process for moving forward to address climate change and to make this target a reality.



COP26 – Our Climate Our Future

‘Uniting the World to Tackle Climate Change’



Where?

Glasgow, UK



COP26 – Where? Glasgow is...



...the Scottish city chosen to host COP26.

...aiming to be one of Europe's 'greenest' cities.

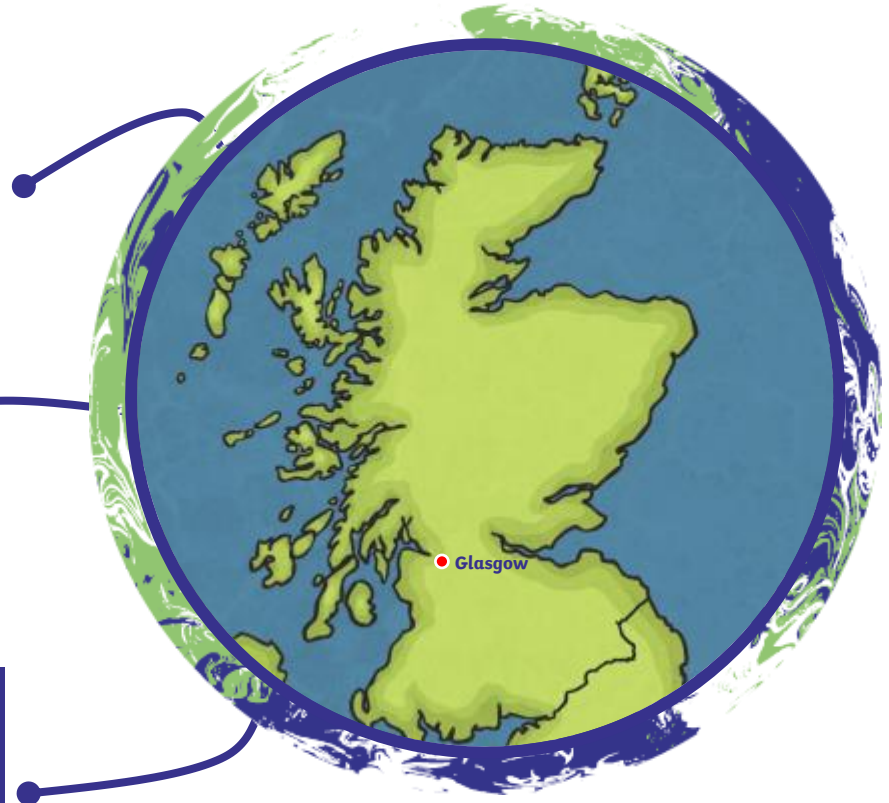
...full of green spaces, parks and has the river Clyde to inspire parties to address climate change.

COP26 – Where? Glasgow is...

...home to the Scottish Event Campus (SEC), which contains exhibition halls, small and large meeting spaces and has a dedicated train station.

...one of the UK's most lively and cultural cities.

...co-hosting COP26 with Milan in Italy, where the pre-COP will take place. This is a meeting before COP26 to share ideas.

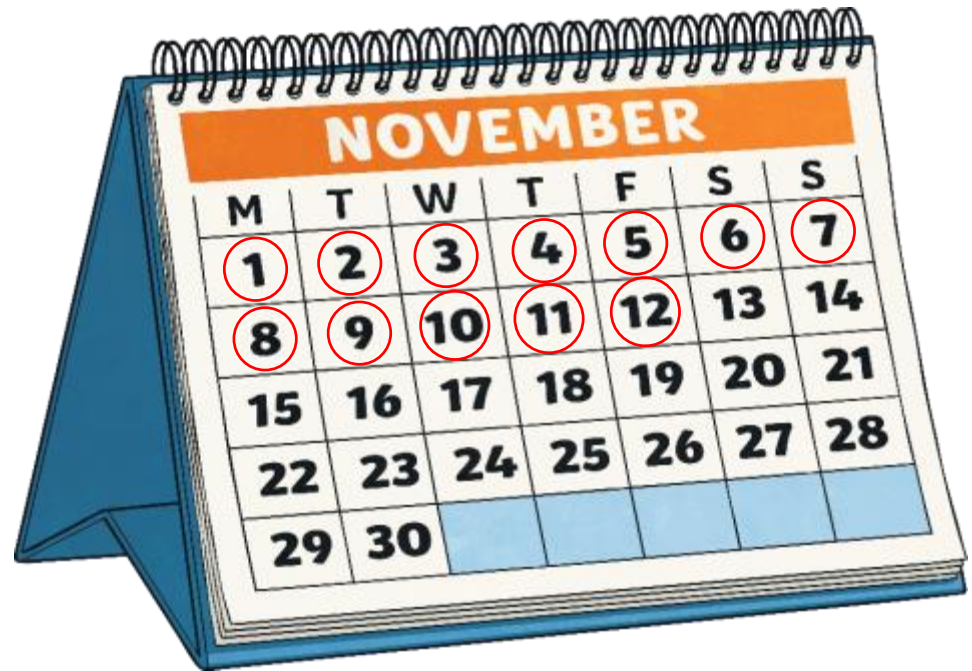


COP26 – Our Climate Our Future

‘Uniting the World to Tackle Climate Change’

When?

1st–12th November 2021



COP26 – Our Climate Our Future



The issue of global warming has been recognised for many years. As far back as 1979, the very first World Climate Conference took place.

根據政府間氣候變化專門委員會
(Intergovernmental Panel on Climate
Change , IPCC) 2021年最新報告指出 ,
我們仍有機會實現將升溫控制在攝氏1.5以
內的目標 , 但前提是現在就要採取前所未有的
行動 , 必須將全球溫室氣體排放量在
2030年之前減半 , 並在2050年達到「淨零」



This is known as the Conference of the Parties (COP) and CC the 26th meeting.

淨零目標

氣候危機 行動目標

碳中和

carbon neutral



透過減碳手段，將二氧化碳排放量實現正負抵消

淨零

net zero



減少所有溫室氣體排放
e.g. CH₄、N₂O、HFC

負碳排

carbon negative



減除的二氧化碳，遠超過所排放的二氧化碳量

氣候中和

climate neutral

讓所有溫室氣體朝向零排放，讓進入大氣層的排放量與地球吸收量達到平衡

What ?

淨零、負碳排、
碳中和、氣候中和

Carbon Neutral V.S Net Zero

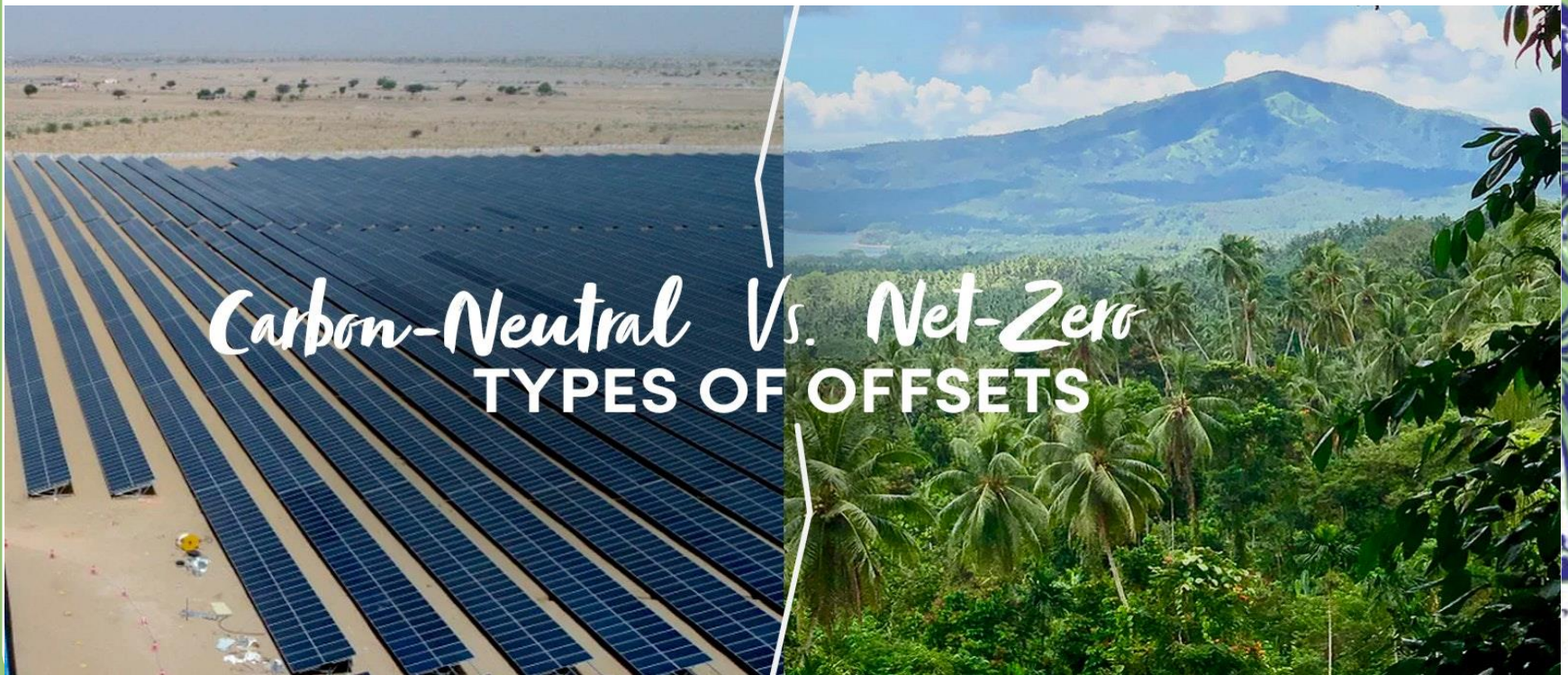


Definition

- Carbon-neutral means purchasing **carbon reduction** credits equivalent to emissions released, without the need for emissions reductions to have taken place.
- Net-zero means **reducing emissions** in line with latest climate science, and **balancing remaining residual emissions** through carbon removal credits.

Types of offsets(抵銷)

- **Carbon-neutral** involves offsetting using **carbon reduction** or removal projects which reduce the amount of CO₂ released into the atmosphere.
- **Net-zero** involves offsetting using **carbon removal** projects which actually take CO₂ out of the atmosphere.



What is carbon removal?

Carbon removal refers to technologies that **remove already-emitted carbon dioxide from the atmosphere**. According to the [Intergovernmental Panel on Climate Change](#), all pathways that limit warming to 1.5°C with no or limited overshoot all use carbon dioxide removal (CDR) to some extent to neutralise emissions from sources for which no mitigation measures have been identified, and in most cases, also to achieve net-zero emissions to return global warming to 1.5°C following a peak over this.

Nature-based solutions

- **Reforestation** – planting trees in places where trees have previously been.
- **Afforestation** – planting trees where there had been no previous tree cover.
- **Blue carbon** – expanding ocean and coastal ecosystems that sequester CO₂ from the environment. These include mangroves, seagrass meadows and saltmarshes.
- **Soil carbon sequestration** – agricultural management practices that increase the amount of CO₂ taken in from the atmosphere by soils.
- **Biochar** – involves growing plants which absorb CO₂, heating them in the absence of oxygen to make charcoal, and adding this to the soil as a method of sequestering carbon from the atmosphere and storing it below ground.

Technological solutions

Technological solutions are those that use technology to capture and store CO₂ from the environment. These include:

- **Bioenergy with carbon capture and storage (BECCS)** – this involves burning plant biomass for energy, and then trapping the CO₂ that is produced. As biomass is a renewable resource, combusting biomass is carbon neutral. When the CO₂ that is produced is captured, this results in negative CO₂ emissions overall.
- **Direct Air Capture (DAC)** – a technological method that uses chemical reactions to separate and capture CO₂ from the air around us. When air moves over these chemicals, they selectively react with and remove CO₂, allowing the other components of air to pass through.

RE 100

RE100是由國際氣候組織（The Climate Group）與碳揭露計畫（CDP）在2014年共同發起的全球再生能源倡議，邀請全球企業公開承諾100%使用再生能源的目標。當中總部在台灣的企業共計10家，台積電、台達電、宏碁等企業都是成員。

RE100

CLIMATE GROUP



宣布加入RE100的台灣企業

ESG (環境、社會、公司治理) 找到適合公司的永續模式。

<https://www.re100.org.tw/video>



製圖：許祖菱



環境資訊中心

順序	企業	達成目標年
1	大江生醫	2030
2	科毅	2048
3	歐萊德	2025
4	葡萄王	2035
5	台積電	2050
6	菁華工業	2040
7	台達電	2030
8	佐科院	2030
9	宏碁集團	2035
10	聯華電子	2050
11	金元福	2050

However...

Have you heard about..? “GREEN WASHING”



Cop 27

1. Adapting to climate change -“Loss and damage”

2. Keeping hope for 1.5 °C

3. Carbon Finance

Warwick Coucil @ UK Example

巴黎協定 vs 溫室氣體

2016達到生效門檻

懶人包總整理



① 什麼是巴黎協定？

《巴黎協定》是由__國於__年12月12日在__年__會中通過的__協議；將取代京都議定書，冀望能共同遏阻全球暖化趨勢。



② 協定內容有什麼？

森林__、減少__、不大量開採尚存的__、__、__，承諾保護地球免於最糟氣候變化：將地球升溫上限設定於「不比__前」高攝氏__度限、並努力只升攝氏__度，__年檢討一次減排貢獻等。

CO₂

CO₂

③ 什麼時候開始生效？



2016/10/4 達到生效門檻

2016/11/4 正式生效

協定生效門檻是占全球__
氣體排放量至少五成五的__
__國批准。在歐洲議會批准前，已有六十二國批准，但只占全球排放量五成二。10/4歐盟採快速批准程序，使國際社會一舉越過五成五的門檻。