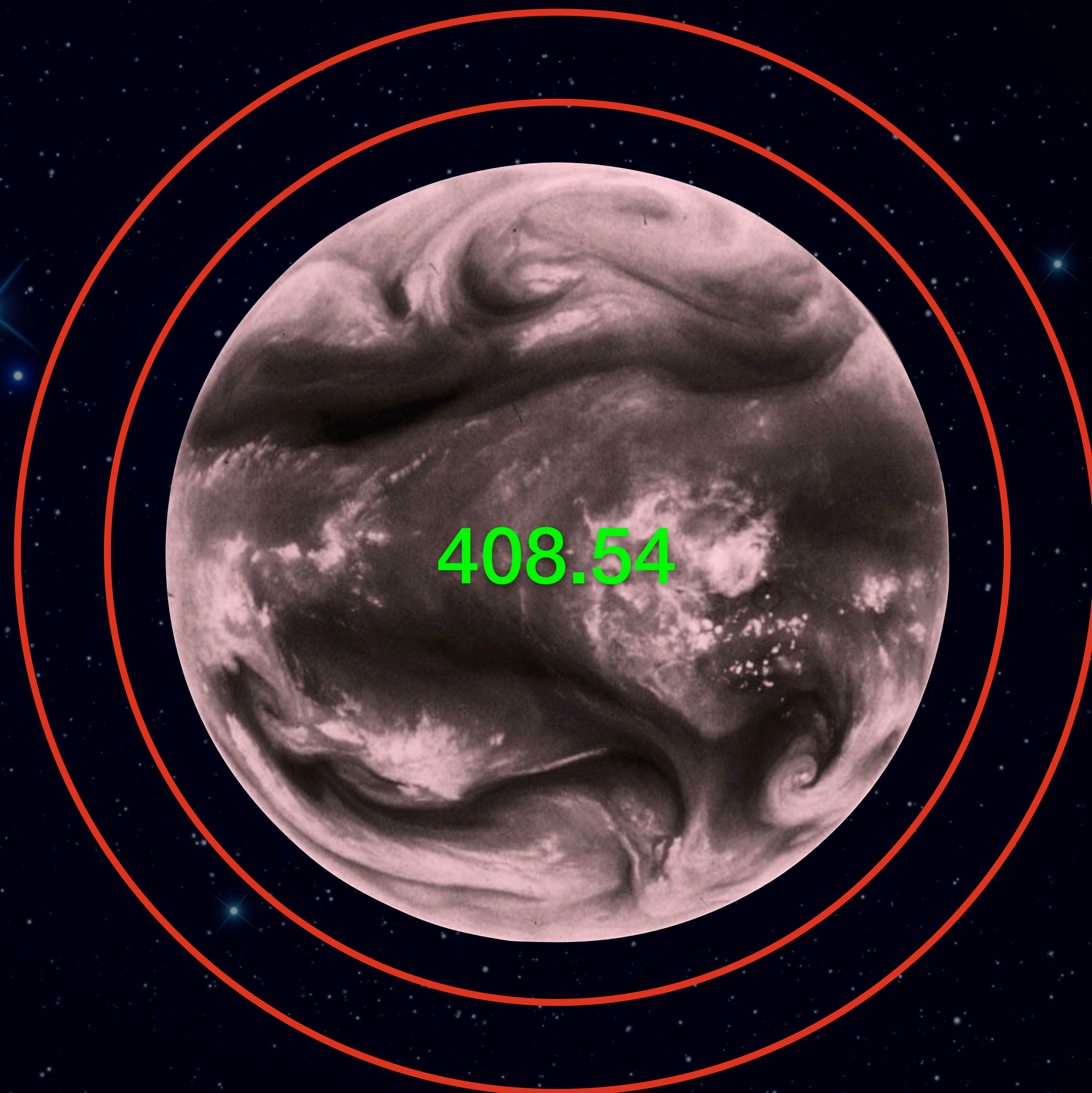


Climate Change

Why the Reluctance?

Prof Chris Rapley CBE
UCL
@ChrisRapley3131

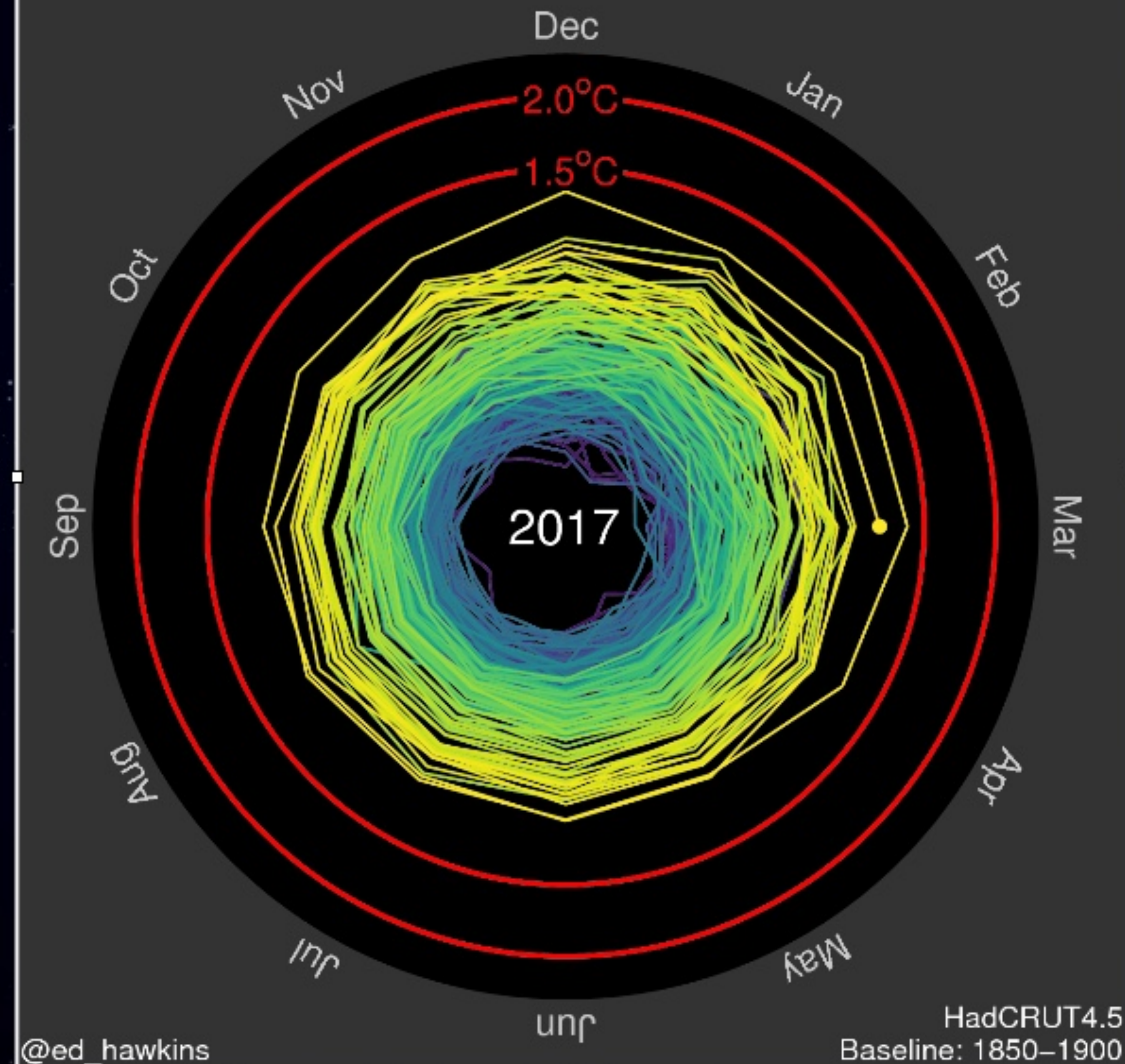


408.54

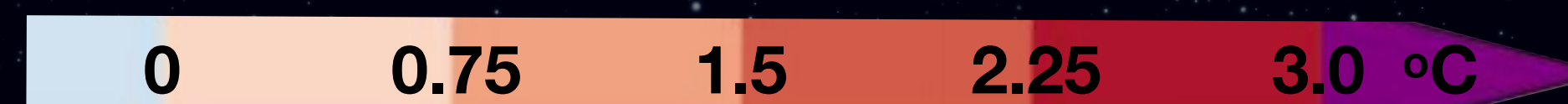
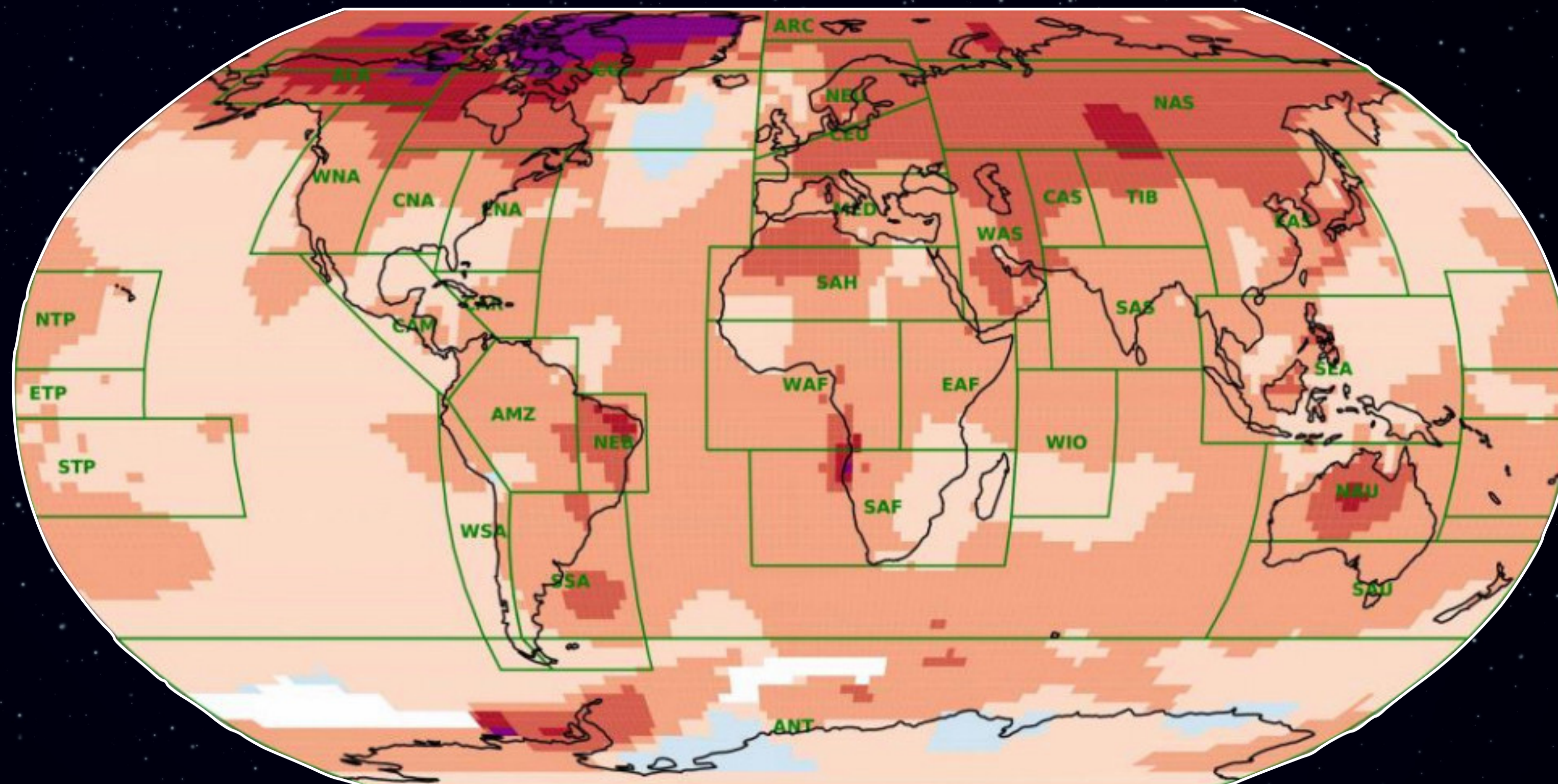


**We have Upset the
Energy Balance of
the Planet**

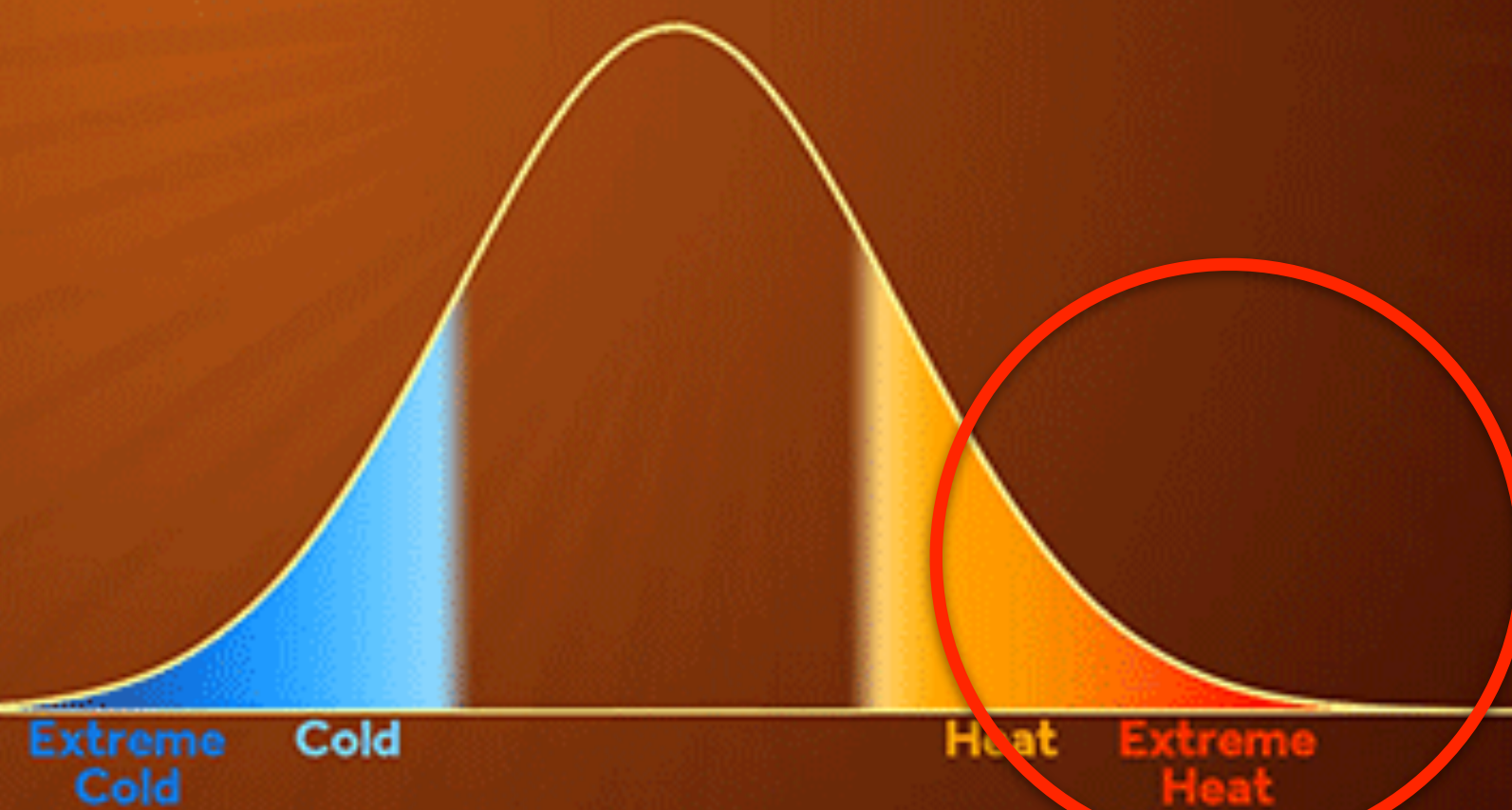
Global temperature change (1850–2017)



2006-2015 relative to Pre-Industrial

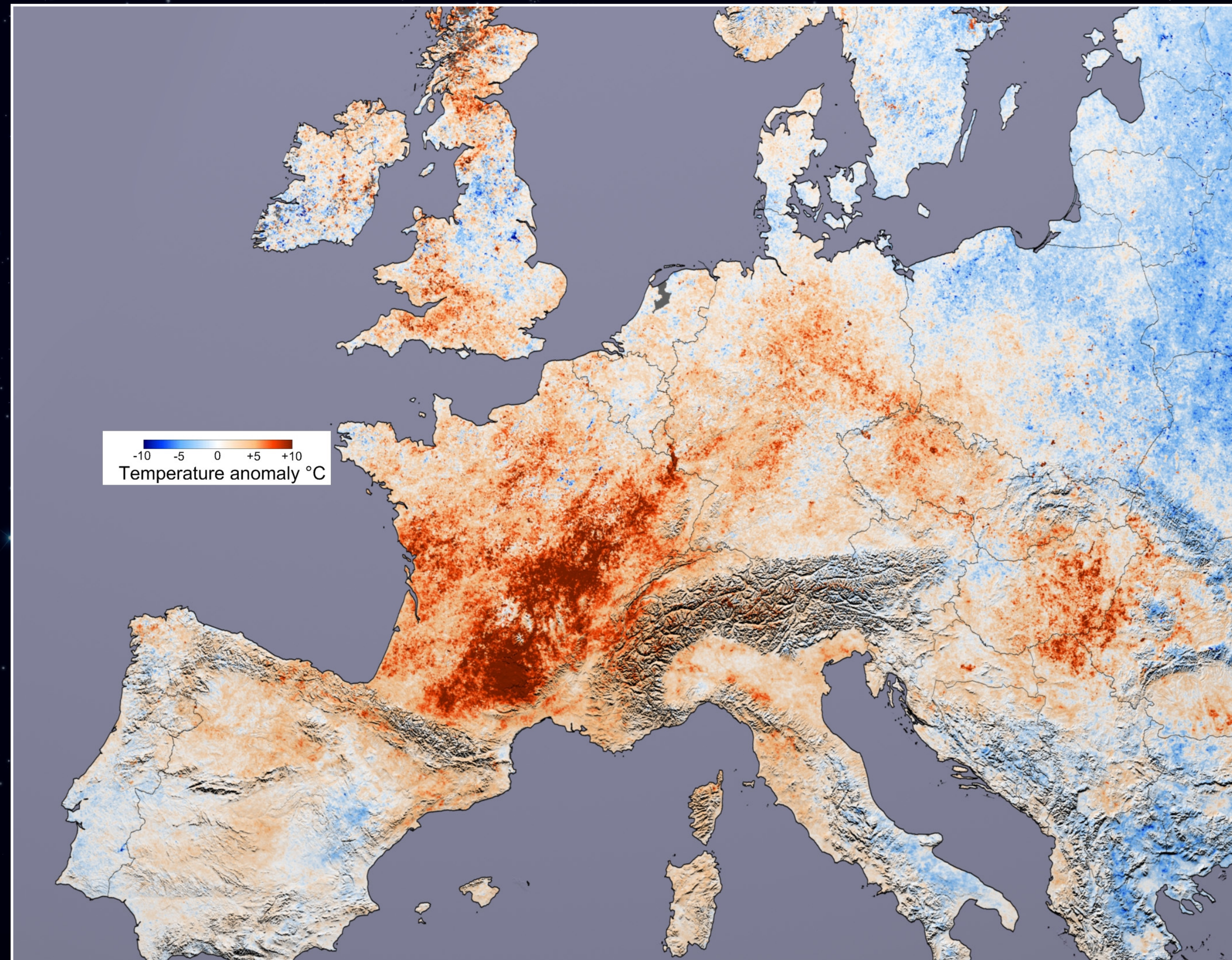


SMALL CHANGE IN AVERAGE BIG CHANGE IN EXTREMES



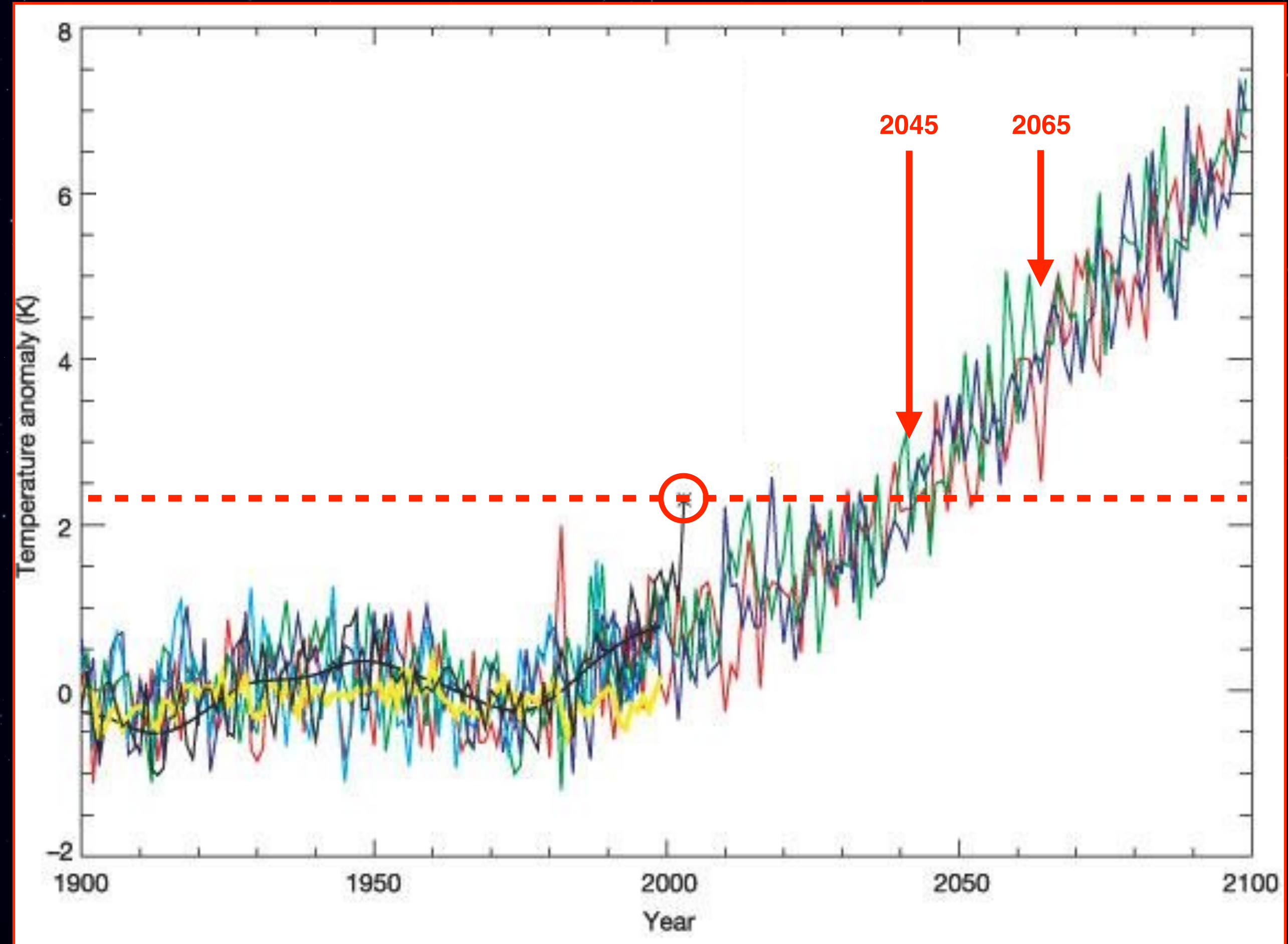
CLIMATE  CENTRAL

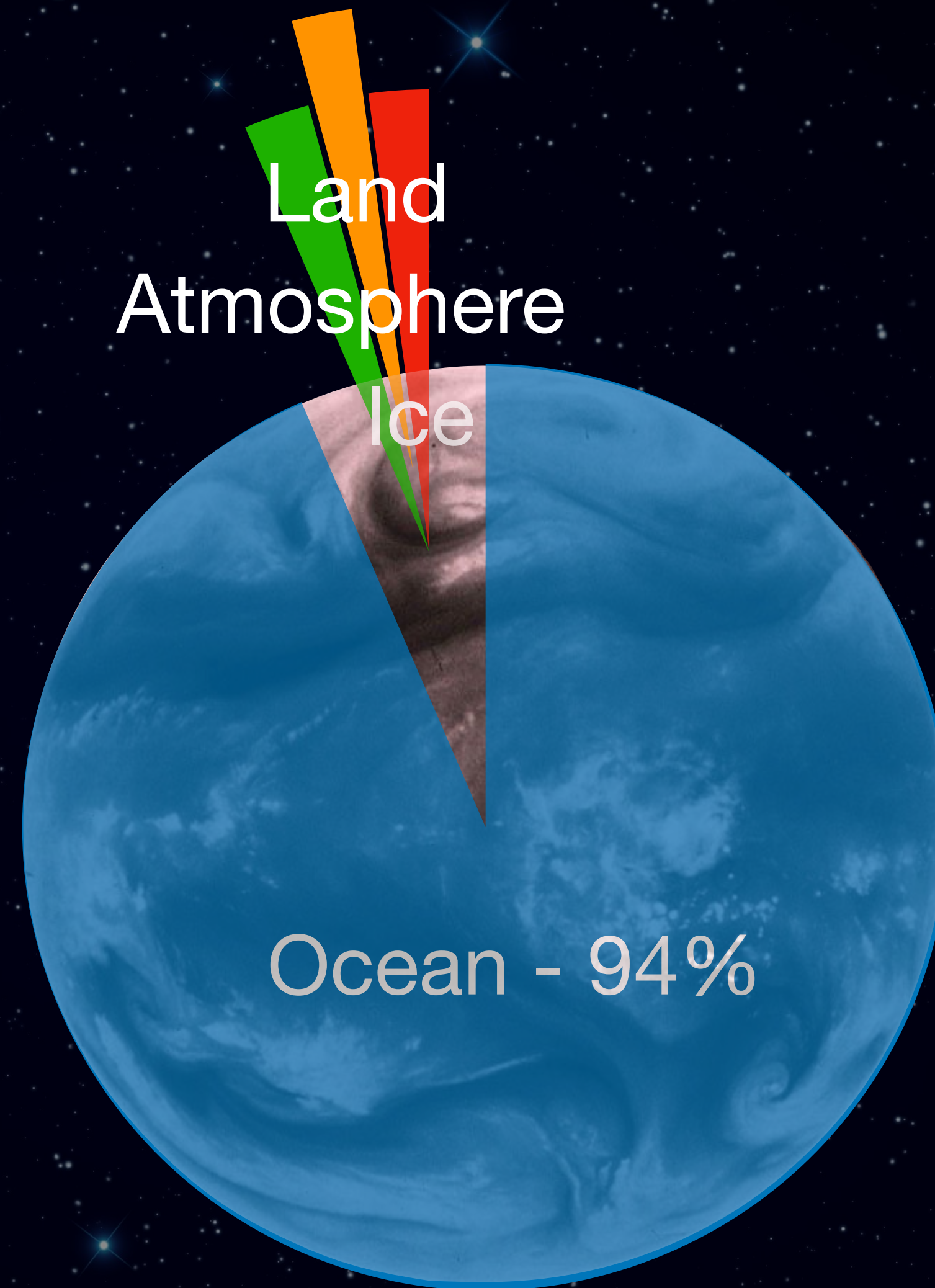
2003 Heat Wave - France



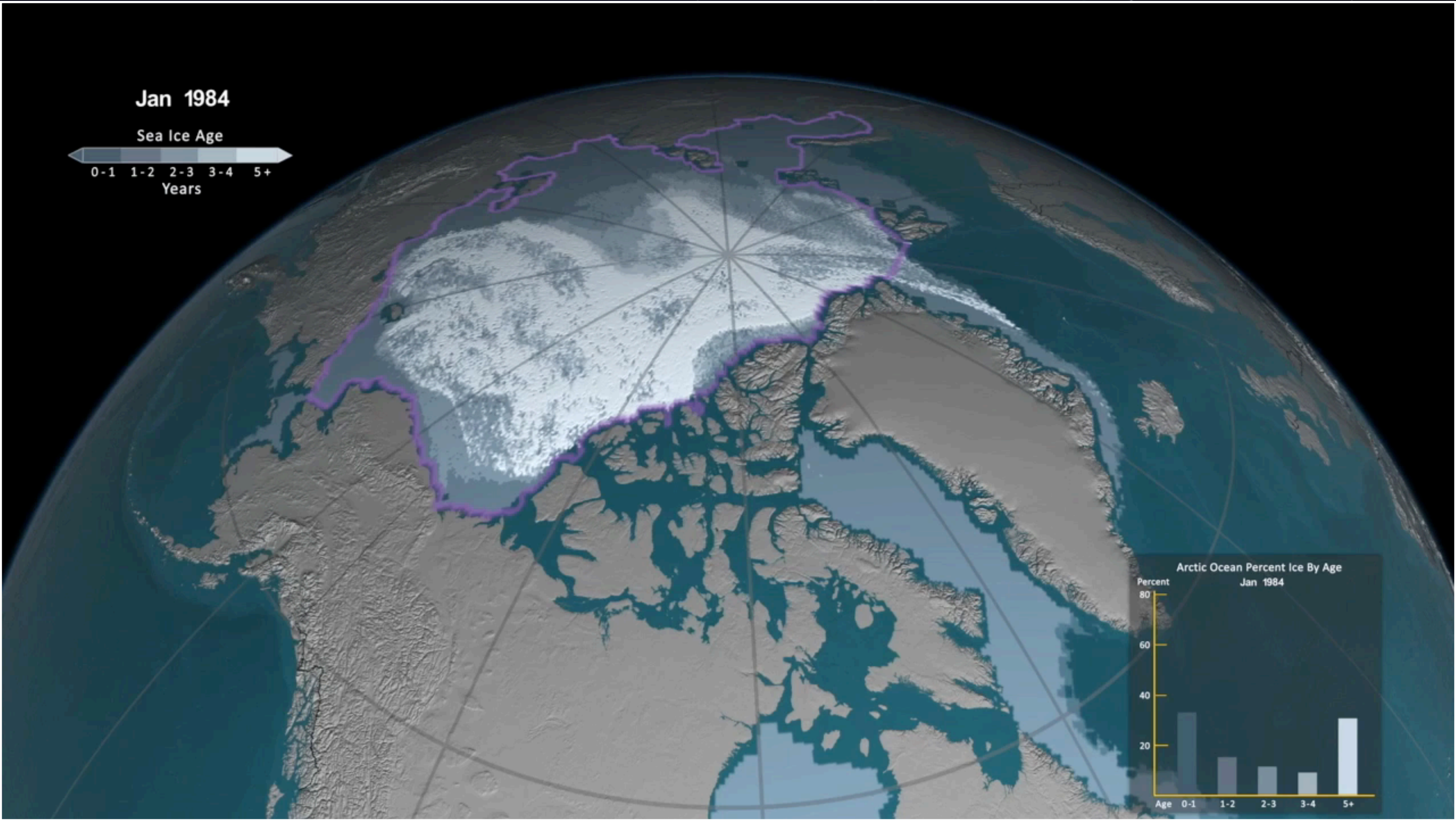


70,000 additional deaths



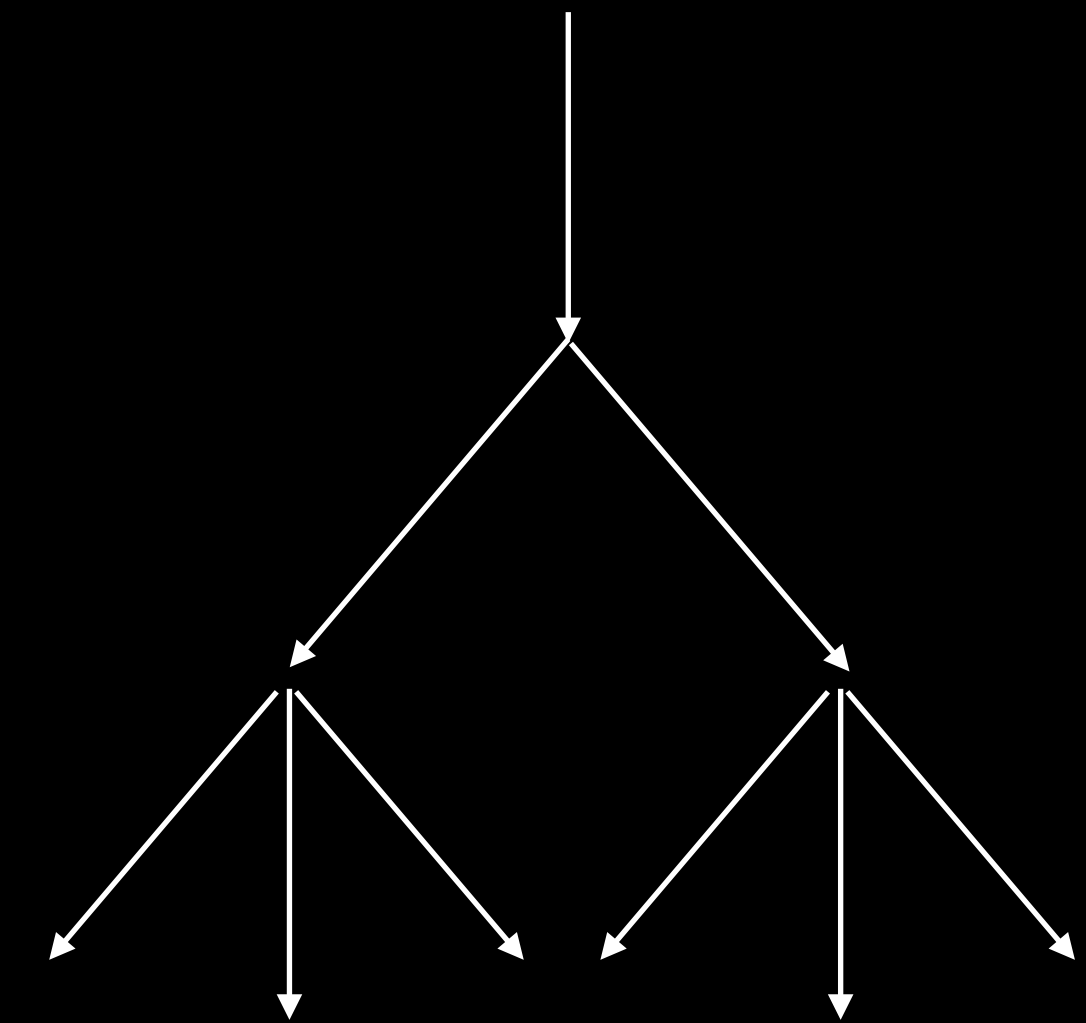


Where Does the Energy Go?



As the Energy Accumulates ...

- The world warms
- Ice & snow melt
- Sea levels rise
- Ocean and Atmosphere circulation patterns change
- Water cycle accelerates
- Extreme Weather Events increase
- Ecosystems respond
- Food and Water supplies are affected
- Infrastructure is damaged or requires upgrading
- Economic and Political Stability are affected
- People and Species are impacted





Imperfectly Adapted



D E P A R T M E N T O F D E F E N S E

2014 CLIMATE CHANGE

ADAPTATION ROADMAP

Rising global temperatures, changing precipitation patterns, climbing sea levels, and more extreme weather events will intensify the challenges of global instability, hunger, poverty, and conflict.





Threat Multiplier



WORLD CLIMATE SUMMIT

PARIS, FRANCE, 2015

Conférence sur les Changements Climatiques 2015

COP21/CMP11

Paris France



Diplomatic Triumph



WORLD CLIMATE SUMMIT

PARIS, FRANCE, 2015

Common Goal - To hold temperatures to well below 2°C relative to preindustrial levels and to pursue efforts to limit the temperature increase to 1.5°C

Collective Plan - To cut anthropogenic emissions and to achieve a balance with removals by sinks in the second half of C21st



Human Ingenuity Unbounded

Mission Innovation



清洁能源 · 创新使命峰会

EIGHTH CLEAN ENERGY MINISTERIAL (CEM8) & SECOND MISSION INNOVATION MINISTERIAL (MI-2)

DATE	TIME	CONTENT	Room
TUESDAY, 6 JUNE 6月7日, 星期二	Various Times Throughout The Day	ACTIVITIES OPEN TO ALL CEM AND MI REGISTRANTS CEM 和 MI 注册人员均可参加	
		Side Events / 边会	
		ACTIVITIES OPEN TO ALL REGISTRANTS 面向所有注册人员	
	09:30 - 17:20	Innovation Theatre / 创新剧场	Auditorium Hall 13 剧院厅
	09:00 - 18:00	Technology Exhibition / 清洁能源技术展	Booths B1-B1000 / 展位 B1-B1000
		Side Events / 边会	
		CEM & MI BUSINESS SESSIONS INVITATION ONLY CEM 和 MI 商业峰会——仅限受邀嘉宾	
	09:20-2:00	Have A Seat / 入座	
	09:00-09:30	CEM & MI Opening Ceremony / 开幕式	Ballroom A1 大堂宴会厅
	09:30-12:15	Mission Innovation Casual Dinner Session / MI 轻松晚餐对话	Ballroom A1 大堂宴会厅
WEDNESDAY, 7 JUNE 6月8日, 星期三		Side Events / 边会	
	07:00 - 09:00	Credentialed and Coffee / 持证入场及咖啡	Ballroom AB / 大堂宴会厅 AB
	09:00 - 09:15	Networking Break / 交流时间	
	09:15 - 09:30	Keynote Address / 主题演讲	
	09:30 - 10:00	Session 1: Revolution Now and Innovation for the Future / 第一议题: 革命现在, 创新未来	
	10:00 - 10:15	Keynote Address / 主题演讲	
	10:15 - 11:00	Session 2: The Transformation of Power Systems / 第二议题: 电力系统的转型	
	11:00 - 11:30	Coffee Networking Break / 咖啡/交流时间	
	11:30 - 12:15	Session 3: Accelerating the Pace of Innovation / 第三议题: 加速创新	
	12:15 - 12:30	CEO Insight / CEO 洞见	
THURSDAY, 8 JUNE 6月9日, 星期四		Side Events / 边会	
	12:30 - 13:45	Lunch with CEM Awards and Other Announcements / 午餐 (含 CEM 颁奖和重要消息)	
	13:45 - 14:30	Session 4: Electric Mobility and Transformation of Transport / 第四议题: 电动交通和交通转型	
	14:30 - 15:00	Updates and Announcements for Mission Innovation Challenges / 更新和 MI 挑战赛的更新	
	15:00 - 15:30	Session 5: Energy Storage and the Role of the Clean Energy System / 第五议题: 储能和清洁能源系统的作用	
	15:30 - 16:15	Coffee Networking Break / 咖啡/交流时间	
	16:15 - 17:30	Low-carbon development: China's energy transition and the role of the clean energy system / 低碳发展: 中国的能源转型和清洁能源系统的作用	
	17:30 - 18:00	Carbon capture and storage: China's energy transition and the role of the clean energy system / 碳捕获和封存: 中国的能源转型和清洁能源系统的作用	
	18:00 - 18:30	CEM & MI Closing Ceremony / CEM 和 MI 闭幕仪式	
	18:30 - 19:00	Networking Break / 交流时间	
FRIDAY, 9 JUNE 6月10日, 星期五		Side Events / 边会	
	09:00 - 18:00	Workshop on Improving Green Consumption through Enhanced Energy Management and Energy Savings 通过提高能源管理和节能来改善绿色消费	Xigao Hall 礼堂
	09:00 - 18:00	2017 International EV Pilot Cities and Industry Development Forum 2017 国际电动汽车试点城市与产业发展论坛	Intercontinental Hotel 洲际酒店
	09:00 - 18:00	Innovation of Green Pattern: Clean Energy Economic Transition 清洁能源经济转型	CHCOC Function Room A 国家会议中心-宴会厅 A
	08:00 - 17:30	The CEM's Global Update Challenge Side Event CEM 全球更新挑战赛边会	CHCOC Function Room C 国家会议中心-宴会厅 C
	08:00 - 14:30	The First MI Smart Grids Innovation Workshop 首届智能电网创新研讨会	CHCOC Function Room C 国家会议中心-宴会厅 C
	14:00 - 16:00	Implementation Framework in Catalytic Energy Efficiency Program in Major Economies - The G20 Energy Efficiency Implementation Framework 主要经济体催化能效计划实施框架——G20 能效实施框架	CHCOC 0808B 国家会议中心-0808B
	16:30 - 18:00	Making the Business Case for Investing in Energy Planning, Management and Productivity 为投资能源规划、管理和生产力制定商业案例	CHCOC 0808B 国家会议中心-0808B
	13:30 - 14:30	Official launch of the 10th Regional Innovation - "Energy Technology Perspectives 2017" 《2017 能源技术展望》发布会	CHCOC 0704B 国家会议中心-0704B
	14:30 - 17:30	Low-carbon development: China's energy transition and the role of the clean energy system / 低碳发展: 中国的能源转型和清洁能源系统的作用	CHCOC 0704B 国家会议中心-0704B
SATURDAY, 10 JUNE 6月11日, 星期六		Side Events / 边会	
	10:00 - 17:30	Clean Energy Education Equipment (CEE) Summit 清洁能源教育装备(CEE)峰会	CHCOC 0704B 国家会议中心-0704B
	09:30 - 17:30	United Clean Energy Forum 清洁能源联合论坛	CHCOC 0704B 国家会议中心-0704B
	09:00 - 17:30	A Future Powered by Renewable Energy Action and Innovation 清洁能源驱动未来——行动与创新	CHCOC 0704B 国家会议中心-0704B
	09:30 - 17:30	Corporate Day of Renewables Day 可再生能源企业日	CHCOC 0704B 国家会议中心-0704B
	09:00 - 12:00	清洁能源装备制造企业展示和研讨会	CHCOC 0704B 国家会议中心-0704B
	10:30 - 16:30	Green Technology - Green Finance - Green Technology Bank Side Event 绿色技术——绿色金融——绿色技术银行边会	CHCOC 0704B 国家会议中心-0704B
	11:00 - 12:30	Regulatory Indicators for Sustainable Energy (RISE): A tool for creating enabling environments for clean energy 清洁能源监管指标: 为清洁能源创造有利环境	CHCOC 0704B 国家会议中心-0704B
	13:30 - 16:00	Stakeholder Challenges for "Energy Transition: Global knowledge energy management and the role of the clean energy system" “能源转型: 全球能源知识管理及其在清洁能源系统中的作用”的利益相关者挑战	CHCOC 0704B 国家会议中心-0704B
	16:30 - 18:00	United Clean Energy Forum Closing Meeting 清洁能源联合论坛闭幕会议	CHCOC 0704B 国家会议中心-0704B



- Accelerate transformational clean energy
- 23 nations + European Union
- Aim for \$30bn/y by 2021

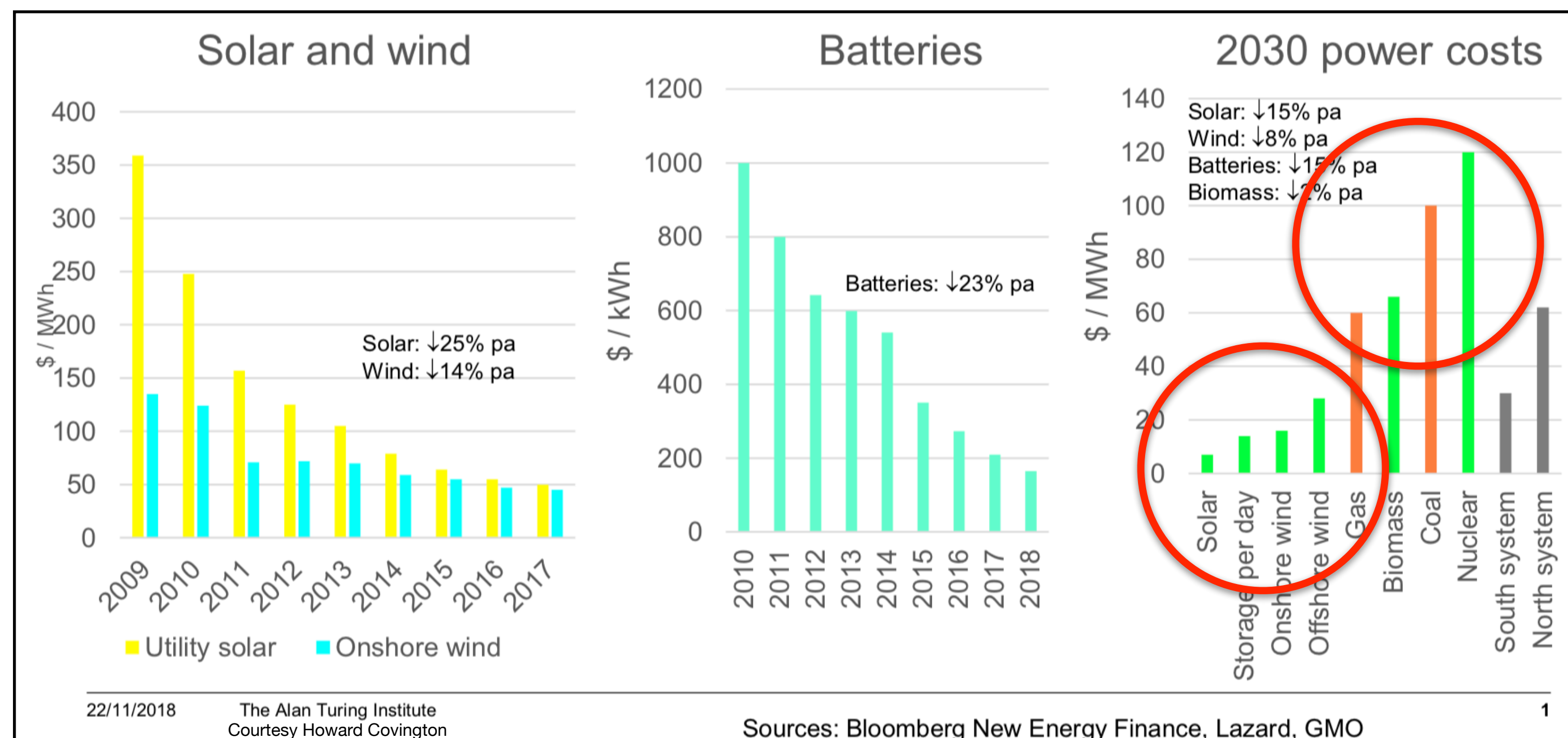


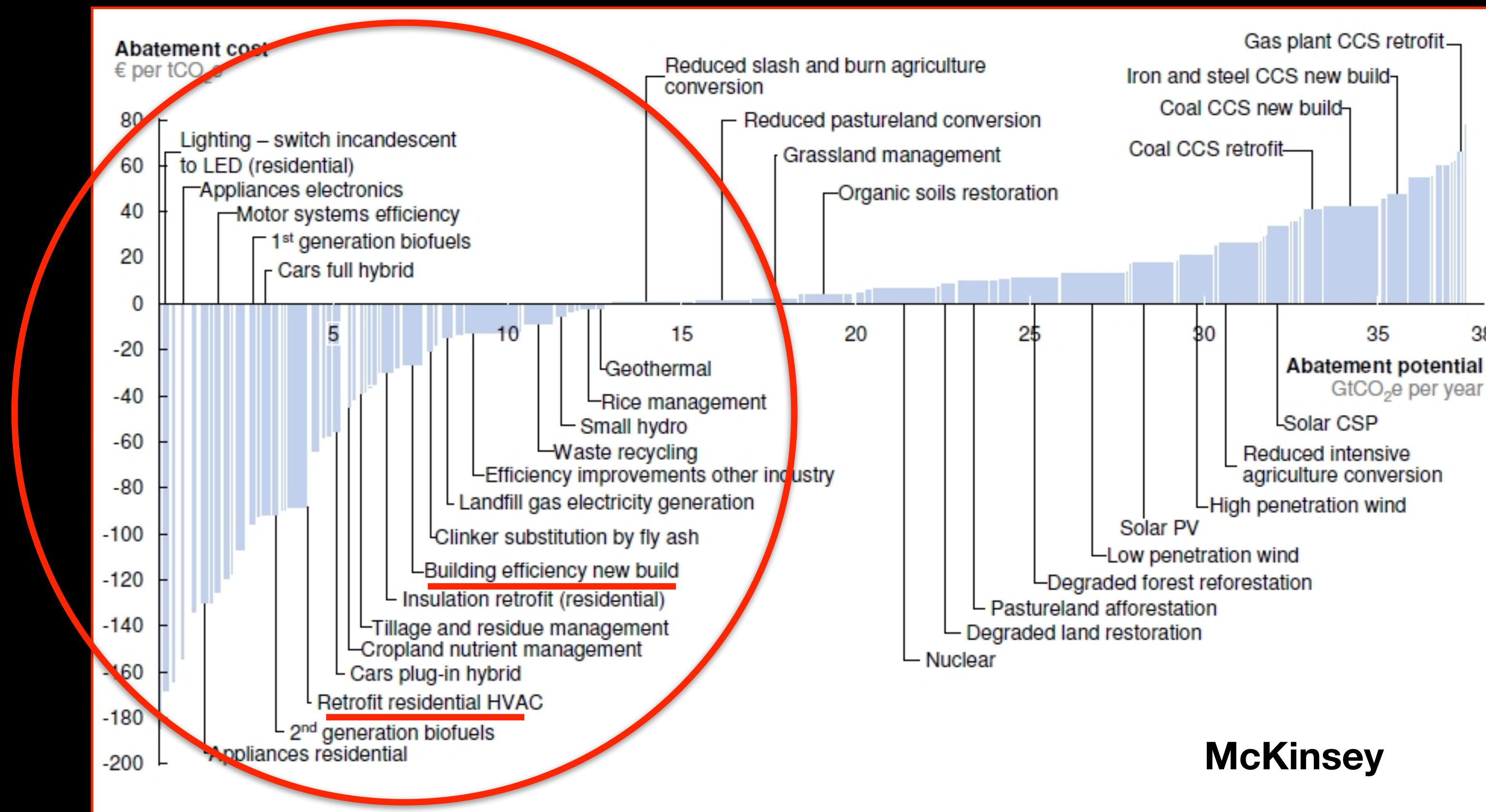


China

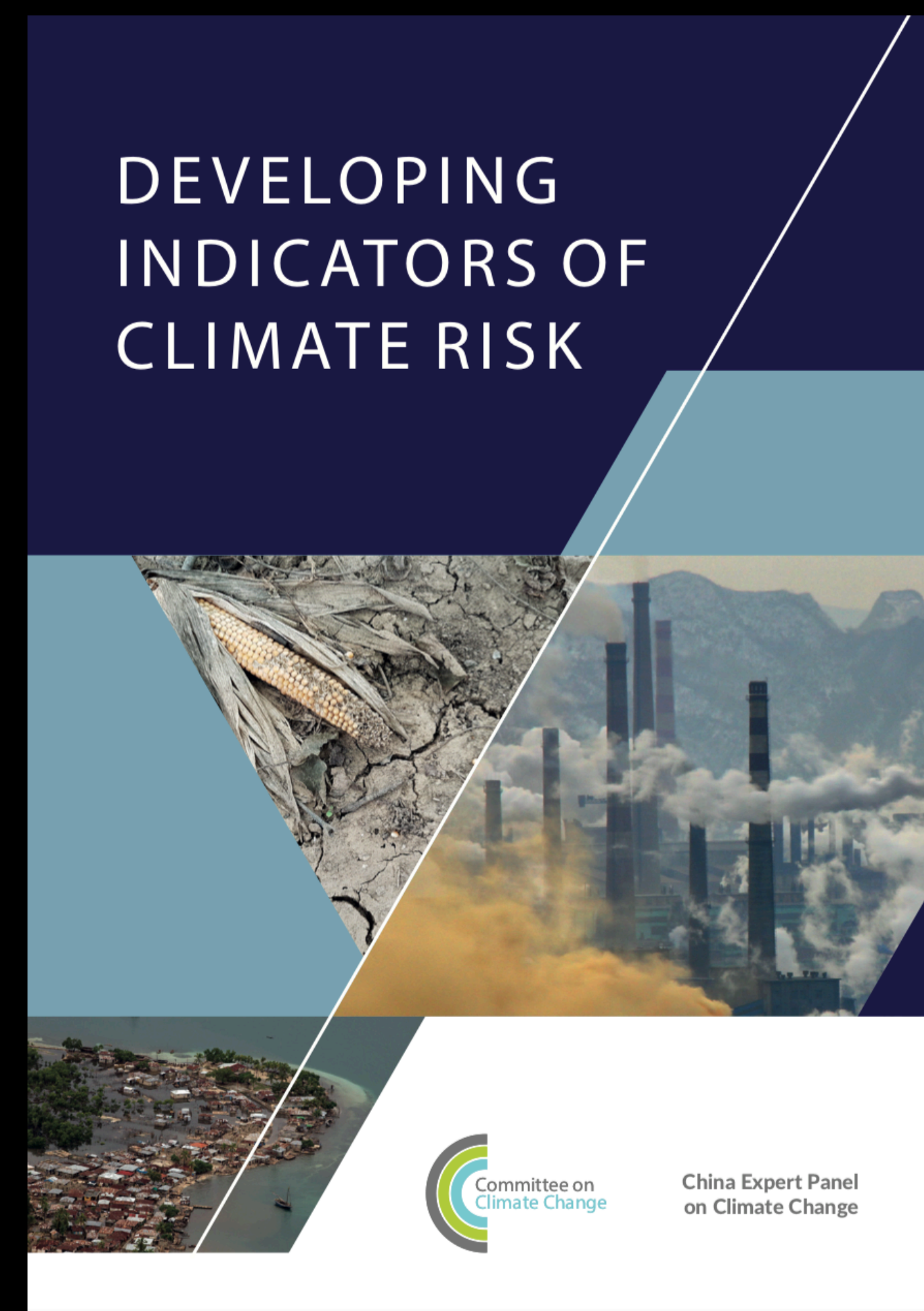
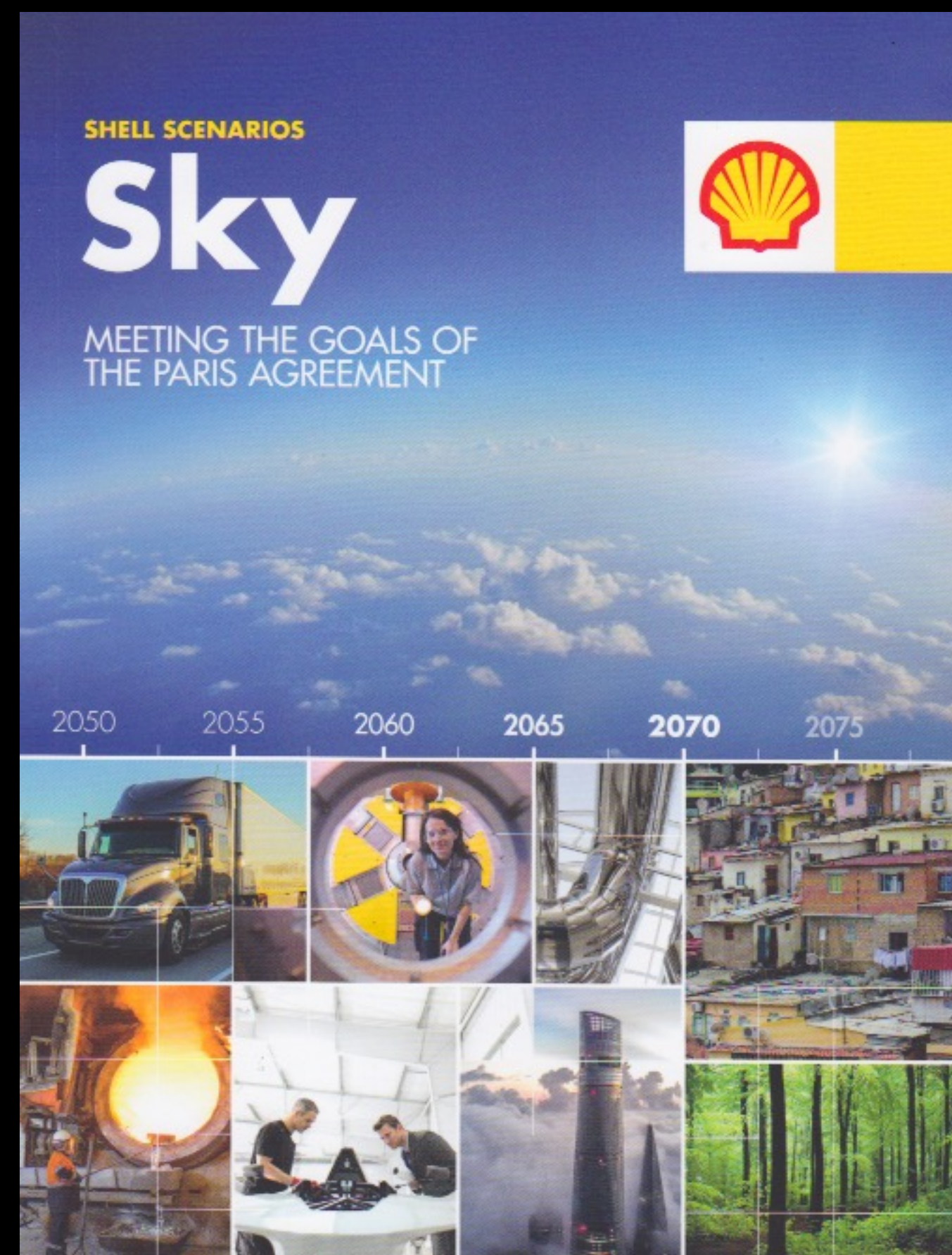
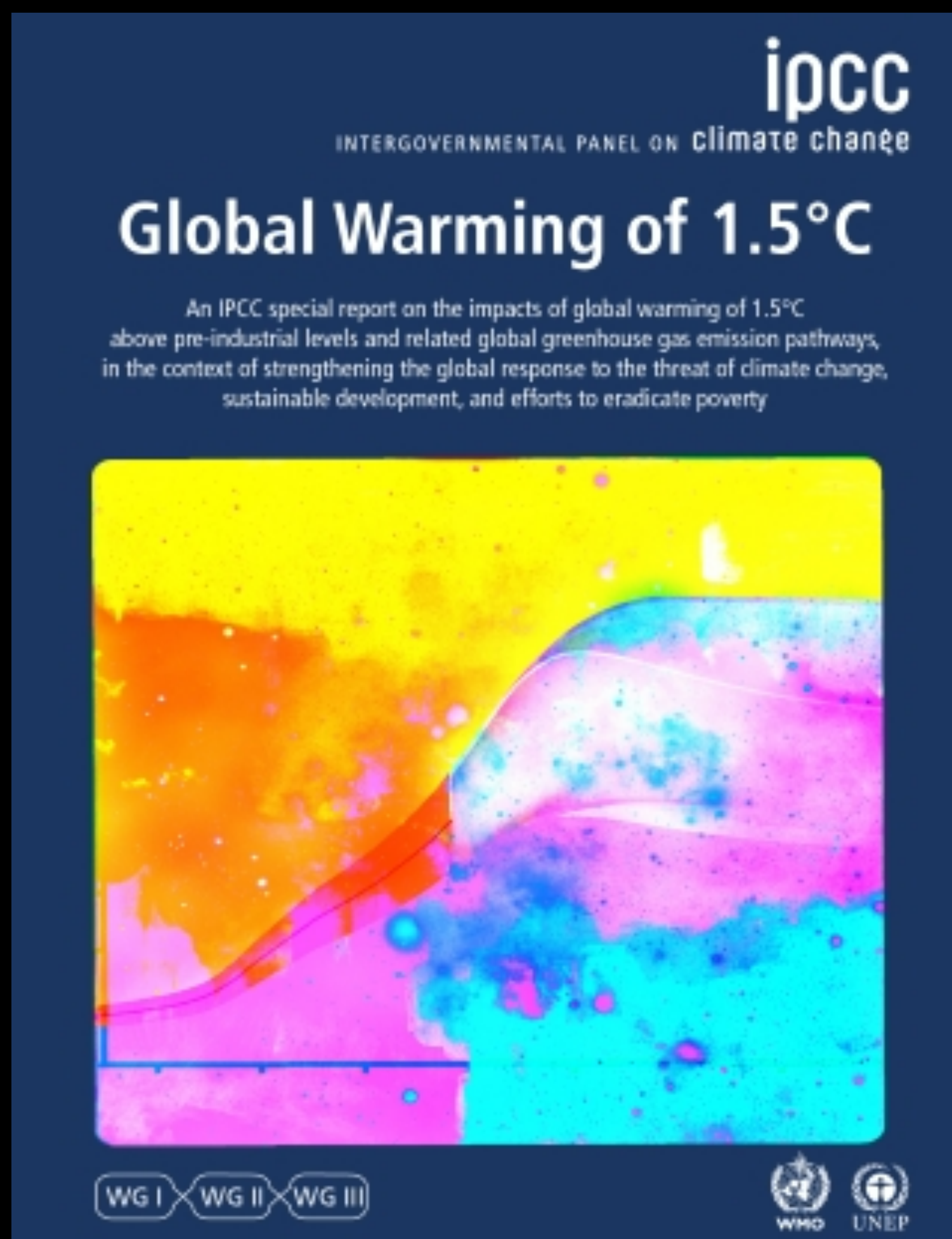


- World leaders in Solar PV
- 3.4m jobs in renewable energy sector
- 20% Renewables by 2030
- 1000GW installation - equivalent to current entire US generating capacity





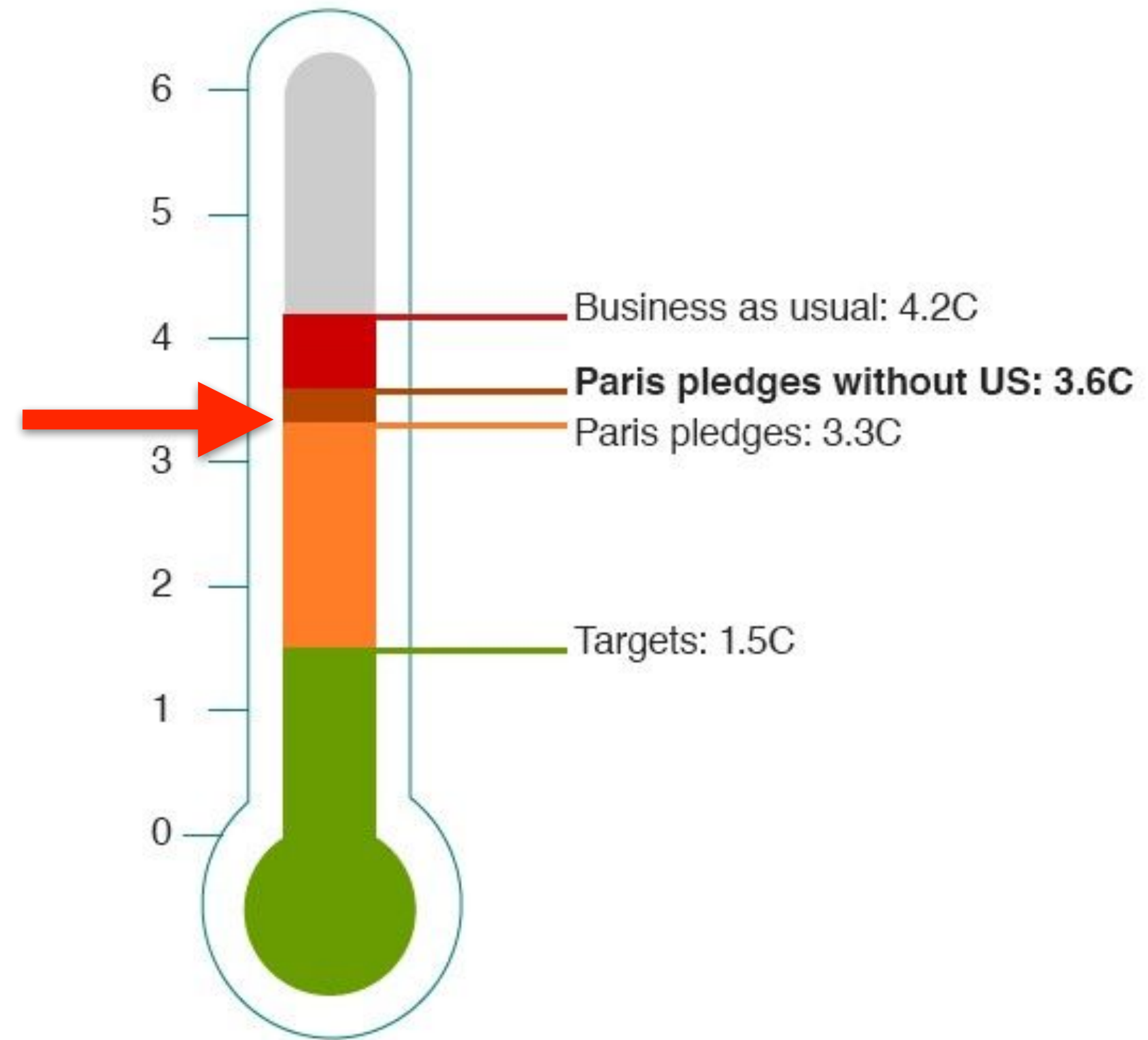
Abatement Options

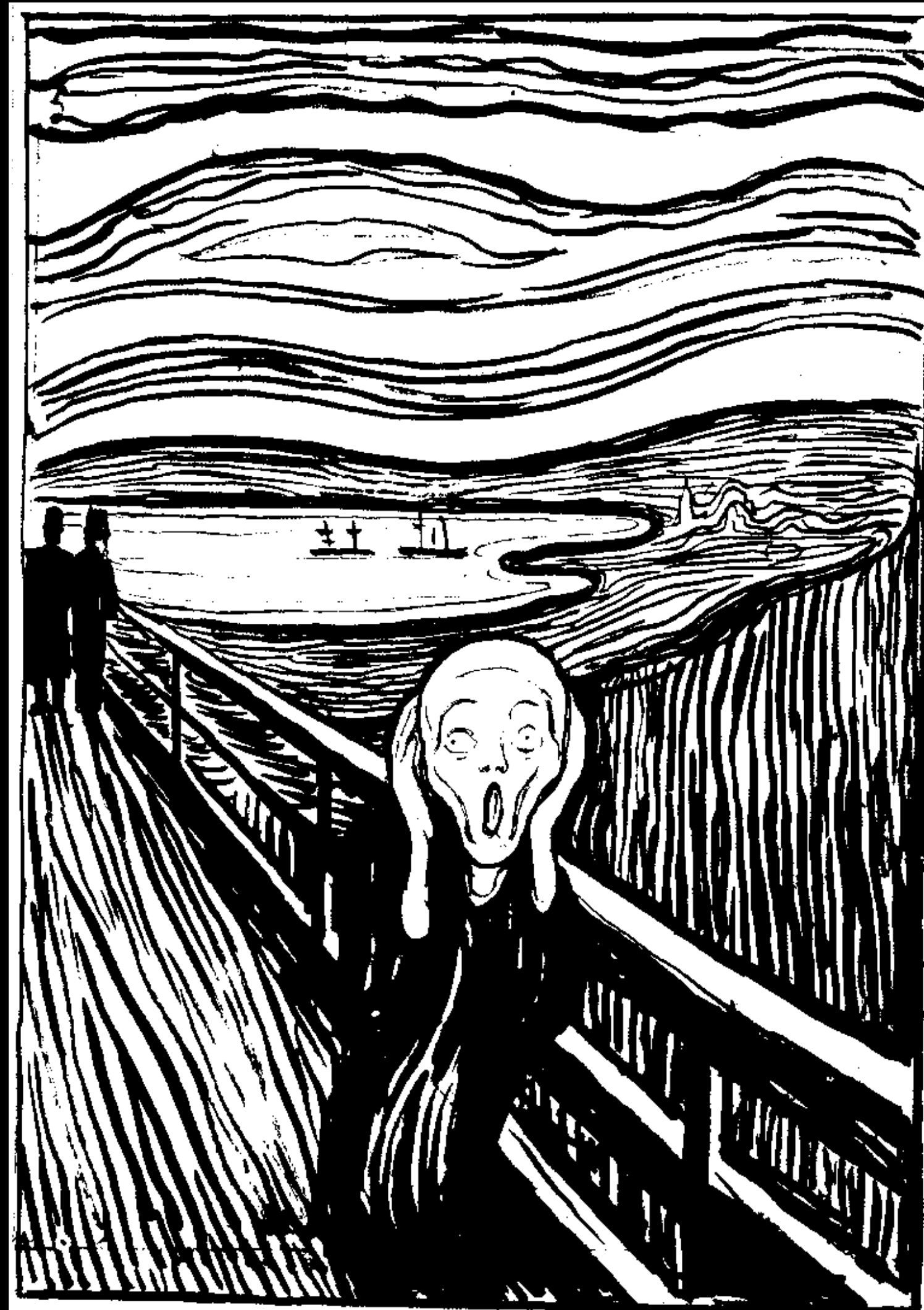


Running Out of Time

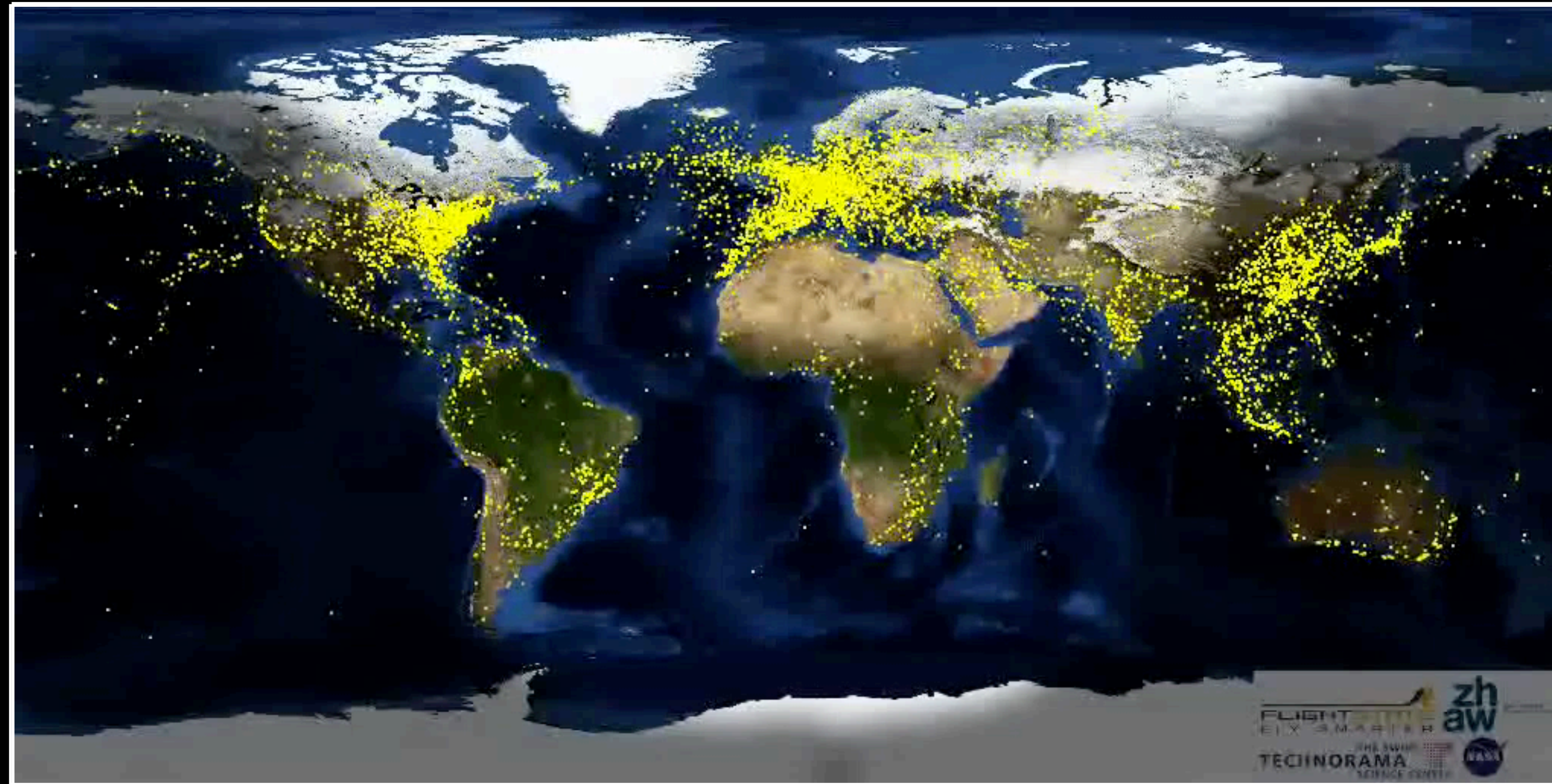
Increase in global temperature by 2100

C°

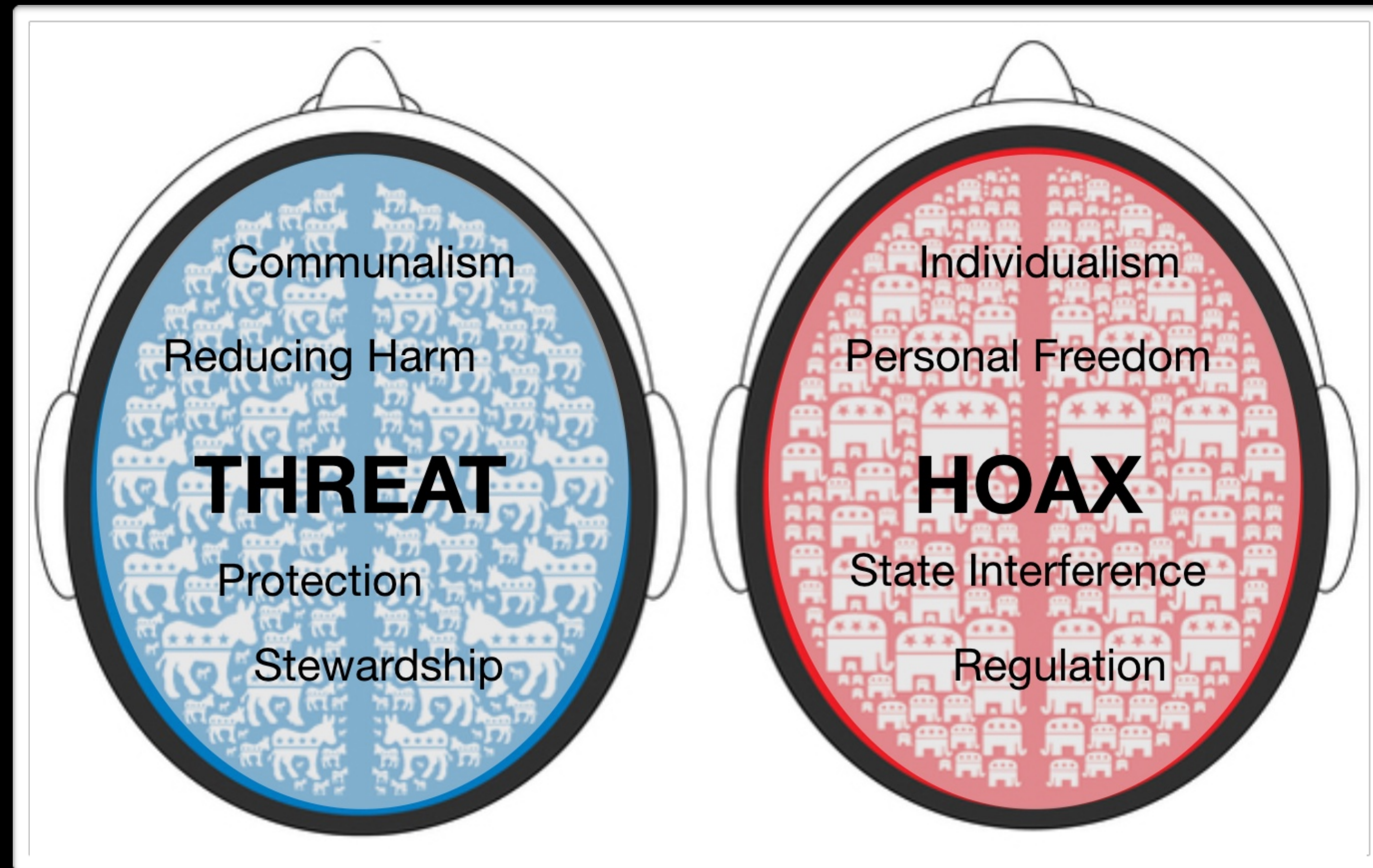




Anxiety, Fear, Loss, Grief, Guilt, **Helplessness**



Threatens deeply established **Practices** and cherished **Lifestyles**



Challenges strongly held **Values** and powerful issues of **Identity**



Negation, Disavowal, Denial, Evasion - Silence, Lack of Action

Personal
Political

UK MPs' attitudes to Climate Change Risks

They are fatalistic and paralysed, afraid of speaking out for being labelled as 'extreme' by colleagues, and above all unprompted to action by any electoral pressure

Messages from constituents expressing concern are rare

Professional



▲ 10:10 climate campaign launch in the Turbine Hall at Tate Modern in London. Photograph: Linda Nyland

The [10:10 campaign](#), which was launched last week, aims to get individuals, companies and organisations to reduce their carbon footprint by 10% in 2010. Over [10,000 individuals](#), [300 companies](#) and [100 organisations](#) have

PERFORMANCE

PERFORMANCE SUMMARY

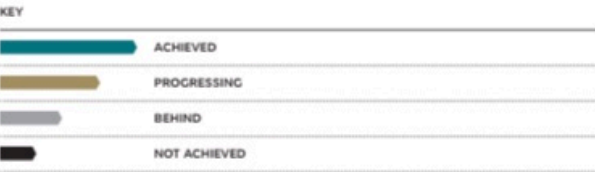
This is a summary of our performance across all of our commitments shown as Achieved, Progressing, Behind or Not achieved.

ECONOMIC

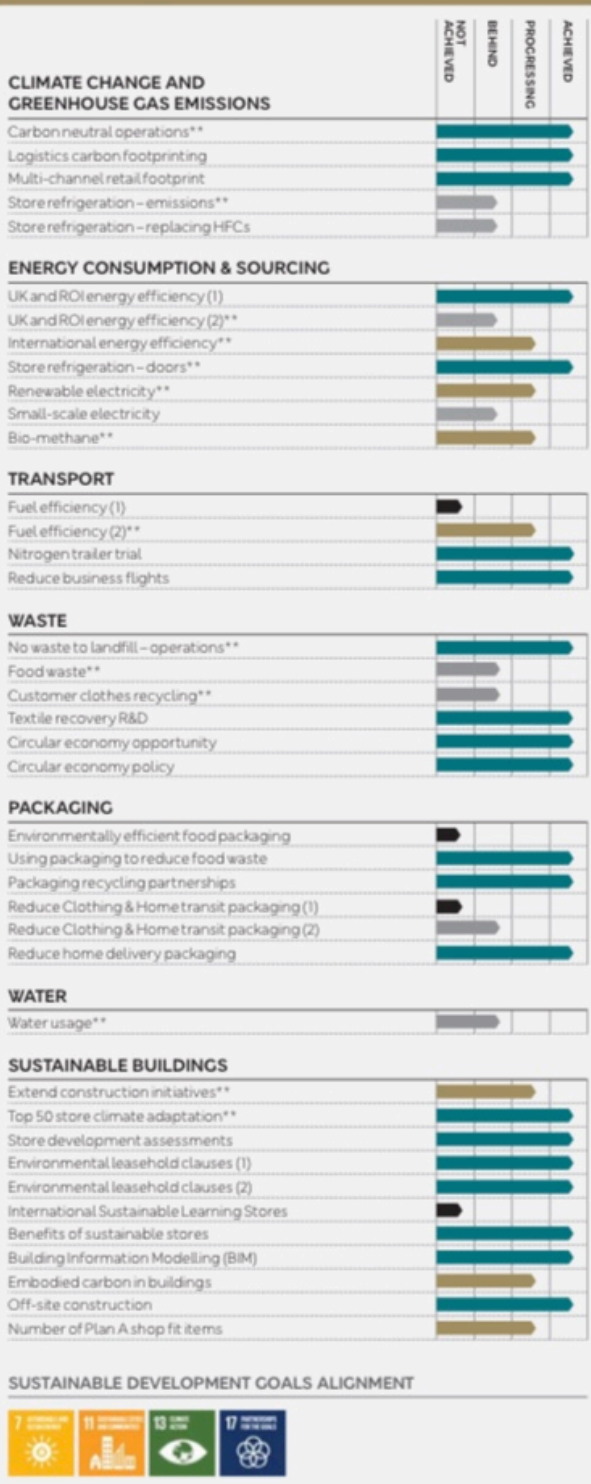
PAGES 14-16

ENVIRONMENTAL

PAGES 17-23



** Assured by DNV CL



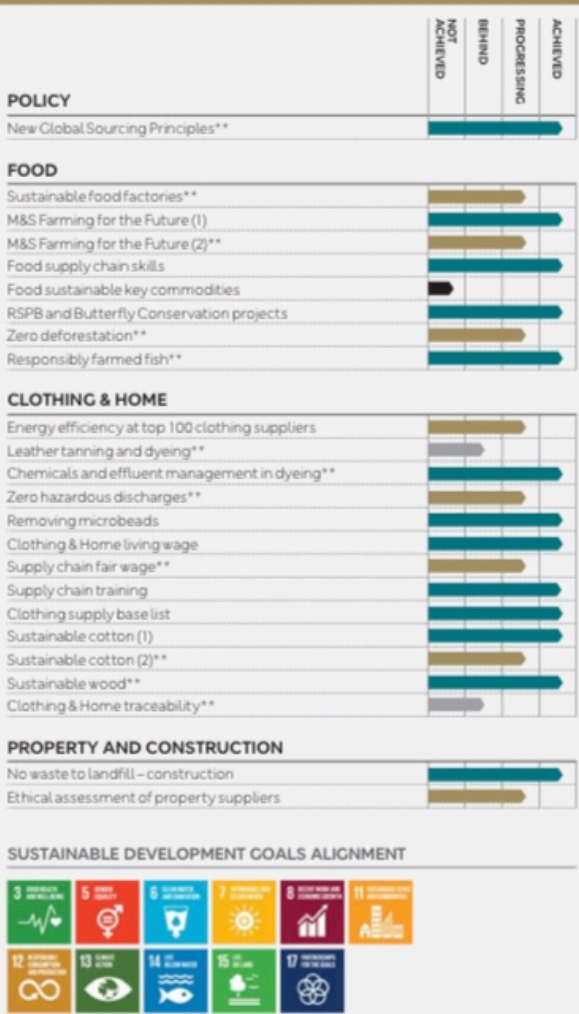
ACHIEVED 64
PROGRESSING 25
BEHIND 11
NOT ACHIEVED 6

SOCIAL

PAGES 24-28

SUPPLY CHAIN

PAGES 29-33



M&S Plan A

Adaptation

- 1.25m residents
- £200bn property value
- 400 schools
- 16 hospitals
- 8 power stations, >1000 electricity substations
- 4 world heritage sites plus art galleries, museums and historic buildings
- 35 tube stations
- 51 railway stations
- >300km roads
- TE2100 protection plan - cost £10bn



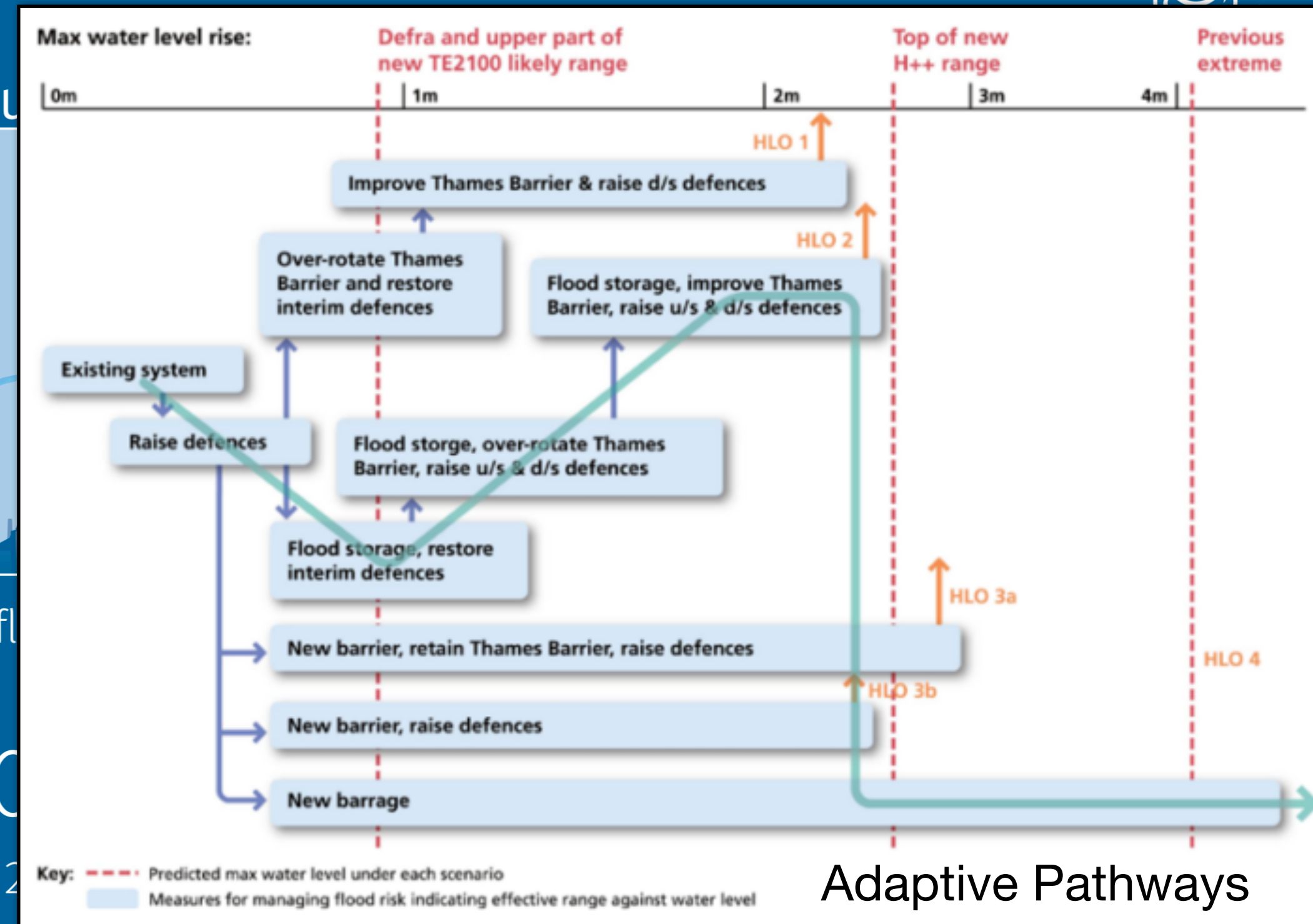
London Floodplain

Thames Estuary

Managing flood risk

TE2100

November 2015





Over to You