

# The Environment



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## Course description

Coordinateur	Sylvaine Perrichot sylvaine.perrichot@universite-paris-saclay.fr
Horaire des cours	Mercredi 13:30 - 15:30 ou 15:45 - 17:45
Salle	2e étage - Service des Langues
Dates des cours	<b>Sept</b> 11, 18, 25 <b>Oct</b> 2, 9, 16, (break) <b>Nov</b> 6, 13, 20, 27 <b>Dec</b> 4, 11 -> <b>Final test</b>
Modalités d'évaluation au contrôle continu	<p><b>1 présentation orale 30%</b></p> <p><b>1 projet 20%</b></p> <p><b>1 note de participation 20%</b> (i.e. travail à distance, homework assignments, participation orale en classe)</p> <p><b>1 test final 30%</b></p> <p><i><b>Assiduité obligatoire: en cas d'absences injustifiées, vous pourrez être considéré comme défaillant.</b></i></p> <p><i>Après une absence: présentez votre justificatif à votre enseignant au cours suivant. Les absences injustifiées à un test ou un exposé sont notées 0/20. Signalez toute situation particulière à votre enseignant (statut salarié, handicap, traitement médical etc...) dès le premier cours, notamment si un aménagement est prévu.</i></p>
PROGRAMME	<p><b>Thème d'étude privilégié :</b> S1 : The Environment - Environmental issues</p> <p><b>Grammaire :</b> groupe verbal (rappel) ; groupe nominal (article, quantificateurs) ; syntaxe</p> <p><b>Enrichissement lexical</b></p> <p><b>Phonologie :</b> alphabet phonétique (sons voyelles et consonnes), accent de mot</p> <p><b>Prise de parole :</b> en continu et en interaction, à travers diverses activités telles que présentations orales, débats, jeux de rôles, discours, etc.</p> <p><b>Expression écrite :</b> résumé d'un article / une vidéo, essai</p>

# Eco-Project - What's wrong with the world? And how to fix it?

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**You will work cooperatively with a group to:**

- assess the environmental situation of a city
- present the best environmental initiatives already implemented in this city (with facts and figures)
- choose 3 important problems that need solving (argue your point) in this city
- present solutions based on environmental initiatives implemented in other cities or that you yourselves have come up with

## **STEP 1 - Choose the city you want to focus on.**

In a group of 3, browse the internet and the national/international press to find cities that have faced environmental challenges and find how they have overcome.

HELP: List issues that cities generally face regarding the environment. Choose one city and gather data to assess the situation (figures, reports...)

**Deadline:** .....

## **STEP 2 - Write a press review**

In your group, select at least 4 articles and 2 videos (2 documents / student) from the press dealing with environmental issues in a particular city of your choice (in an English-speaking country). The articles/videos should not tackle the same issues.

Each one of you chooses **one** document (an article or a video) and **writes a press review** (1/3 of the original ):

- ☐ Write an introduction
- ☐ Make a presentation on the problem(s) and solution(s) proposed in the article/video
- ☐ Write a conclusion to explain why you chose this article

**Deadline:** .....

## **STEP 3 - Propose solutions to unsolved issues**

Find several issues that the city you chose is facing.

Browse the internet to find solutions or come up with your own solutions to the problem the city of your choice is facing.

**Deadline:** .....

## **STEP 4 - Get your presentation ready**

**You are counselling the city on how to lessen its impact on the environment.**

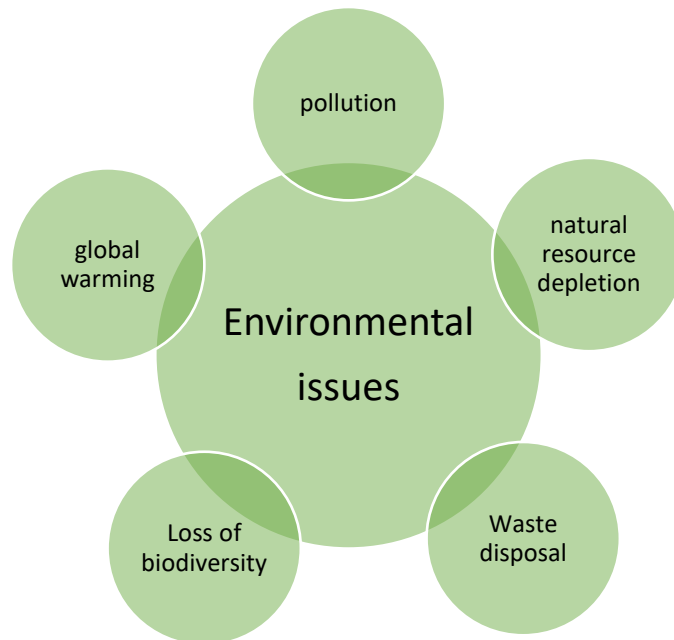
1. Present the city (main information) focusing on the environment
2. Present the best environmental initiatives in the city you chose (with facts and figures)
3. Choose the 3 important problems that need solving (argue your point) in this city
4. Present solutions based on environmental initiatives implemented in other cities or that you yourselves have come up with

## The Environment - Introduction

---

1. Look at the diagram below. Choose one environmental issue and find:

- a. **problems** (e.g. pollution can be air pollution, water pollution...)
- b. **causes**
- c. **consequences**
- d. **solutions**



2. Compare with your neighbour and complete yours.

**Task - Create a poster to raise awareness of environmental issues.**

You may choose to focus on a specific issue or take a more general approach.

You must include:

(an) **illustration(s)**

a **catchphrase**

the **name** of the company / organization you belong to

the **logo** and the **slogan** of this group

Work in groups of three students.

1. Discuss your **strategy** and make choices: topic? elements? layout? colors?

Every single detail must be part of your strategy.

2. Design a **rough version** of the poster.

3. Prepare a **short oral presentation** of your poster: it must be well-structured and punchy!

4. Present your poster to the class. Be ready to answer questions and defend your strategy. This is a competition!

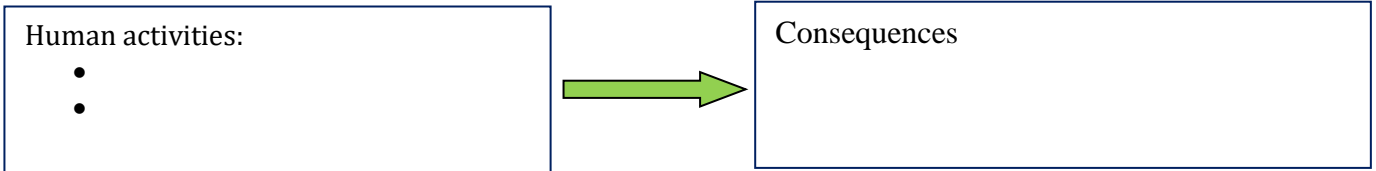
# Climate change

Find more information and vocabulary on this subject on eCampus

## LISTENING - Causes and effects of Climate Change (3'04)

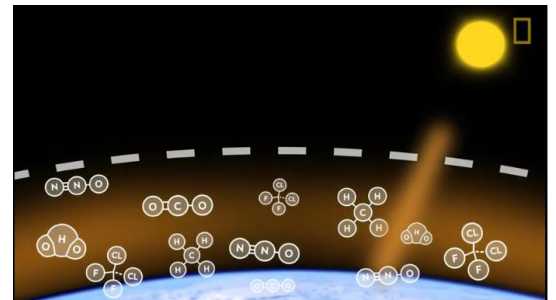
<https://youtu.be/csf8bn5enok>

### Part 1 - Introduction



### Part 2 - The Greenhouse effect

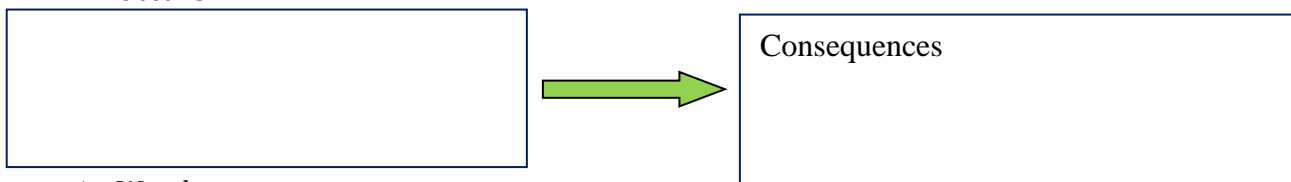
Explain what the greenhouse effect is and why it is called that way.



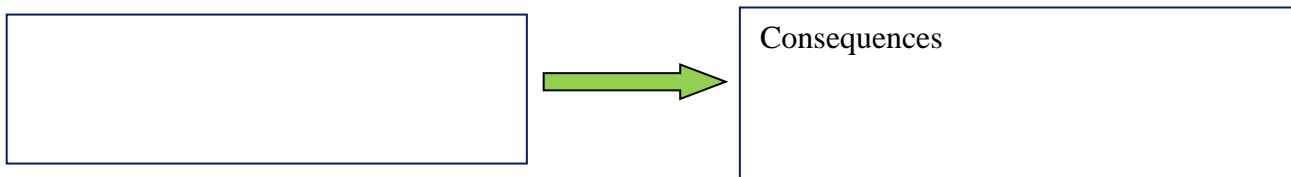
Evolution of the Earth's climate

### Part 3 - Consequences of Climate change

⇒ Oceans



⇒ Weather



⇒ Food (agriculture challenges)

- 1.
- 2.
- 3.

⇒ Health - What is responsible for health problems? .....

- 1.
- 2.
- 3.

### Part 4 - How can we fight climate change?

## **Discuss: What will happen when global warming exceeds 1.5°C?**

### **What's in a number?**

Despite the totemic status of the goal to keep global warming below 1.5°C, there is no magic temperature threshold beyond which the world is doomed. For every extra fraction of a degree Earth heats up, the impacts will become more extreme. So, in many ways, crossing the 1.5°C threshold is a political milestone, rather than a scientific one.

In reality, 1.4°C of warming offers a better future than 1.5°C, while 1.7°C of warming is still a victory compared with 2°C. Richard Betts at the UK's Met Office likens the risks of warming to national speed limits. "With a speed limit of 70mph, it doesn't mean that 69mph is safe necessarily, and it doesn't mean that 71mph is going to kill you," he says. "But the faster you go, the more in danger you are."

Yet a breach of 1.5°C can't be ignored. It fires the starting gun on a process of destruction that threatens to obliterate whole ecosystems and, with them, entire human cultures (see main story). People on the front line of climate change will experience this fate first. But if we fail to act, we will all follow.

In groups of three or four, discuss the consequences of human-made global warming. Remember you are speaking of **causes**, **consequences** and **hypotheses**. You can also use comparisons to express your ideas.

## **READING -**

### **The uncomfortable reality of life on Earth after we breach 1.5°C**

By Madeleine Cuff – *New Scientist* - 7 June 2023

*Madeleine Cuff is an environment news reporter at New Scientist*

THIS time next year, you may be living in the same house, driving the same car and doing the same job. But in one fundamental way, life on Earth could have shifted irrevocably. Spiking worldwide  
5 temperatures, boosted by a transition to an El Niño climate pattern, could make 2024 the year that global warming exceeds 1.5°C for the first time. It may not sound like much, but scientists warn it will be a totemic moment for the planet.

10 Undoubtedly, breaching 1.5°C is a sign of political failure. Just eight years ago, almost every nation agreed to a binding treaty promising to hold the global temperature rise to a maximum of 1.5°C  
15 above pre-industrial levels. Blowing past that threshold so soon will bring huge political fallout and unleash reactionary forces that could turbocharge – or cripple – the climate movement. "All hell will break loose," says Jochem Marotzke at the Max Planck Institute for Meteorology in  
20 Germany. "That is something I'm very sure of."

But beyond this discontent, there are many other impacts of crossing this threshold. It will have catastrophic consequences for people living in the hardest-hit parts of the world and bring even wilder,  
25 more unpredictable and extreme weather for all of

us. If we can get the temperature back down, this period may pass. But if emissions keep climbing, the climate will become increasingly hellish. That much is clear if you consider the communities now living  
30 on the front line of climate change. Understanding their experience gives a glimpse into the future for all humanity. It might also motivate us to do more to try to reverse the damage.

The world has already warmed by 1.2°C since  
35 pre-industrial times, caused by rising levels of greenhouse gases in the atmosphere. According to the World Meteorological Organisation, there is now a 66 per cent chance we will see a year with warming above 1.5°C by 2027. But scientists work  
40 on averages. A single year of this won't count as an official breach of the 1.5°C goal set by the 2015 Paris Agreement. For that to occur, the global average warming must exceed that figure, on average, over a 20-year period. This means we will only know for sure if we have breached 1.5°C with hindsight.  
45 Nevertheless, Marotzke says it is set to happen within a decade, based on the existing warming baked into the climate system. "Pretty much no matter how the emissions evolve, we will cross or reach that 1.5°C line in the early to mid-2030s," he  
50



says. In climate terms, he warns, that is “around the corner”.

55 In mild regions – northern Europe and much of the US, say – life beyond 1.5°C may not feel so different for most people. Heatwaves will be fiercer, droughts longer, wildfires more frequent and rainstorms heavier, but day-to-day life is likely to continue largely uninterrupted, at least initially. However, the story is different in regions where  
60 temperatures are climbing faster than the global average. For people living in those places, overshooting 1.5°C of global warming could be a matter of life or death.

### Ice caps melting

65 The impact of climate change is already being felt keenly in the Arctic, which is heating up four times faster than the rest of the planet, the victim of a feedback loop that sees warming accelerate as the ice melts and solar reflection reduces. In the  
70 northern parts of Newfoundland and Labrador in Canada, average winter temperatures have increased by more than 1.5°C since the start of the 20th century. For the local Inuit populations, this is causing major disruption, says Ashlee Cunsolo at  
75 Memorial University, St John’s, Canada. In particular, the late and unstable formation of winter sea ice undermines traditional pursuits such as hunting, fishing and spending time in winter cabins. “When the ice forms, everything opens up. It’s everyone’s  
80 favourite time of the year, because you can drive everywhere,” says Cunsolo. “So when ice forms later and breaks up earlier, that takes away months of time that people have [to do that].”

85 Photographer Eldred Allen has lived his whole life in the Nunatsiavut region of Newfoundland and has seen the changes with his own eyes. “In the fall, you would get a long stretch of cold weather, you would get nice strong ice forming, and then winter sets in,” he says. “Now, it is not until probably mid-  
90 January that the body of water is frozen up enough that it is safe to cross. It is getting later and later to freeze up every year, and it is melting earlier every year as well.” The late freezing means Allen and his family are struggling to cross the frozen ocean to reach their winter cabin. Then, once they arrive, they worry that swings in temperature could cause the ice to thaw and crack. “It will be –20°C [–4°F] one day and 2°C [35.6°F] the next day,” he says. “Our kids are constantly hearing us talk about whether it’s going to  
100 be safe.” This isn’t an unfounded fear. Two years ago in January, a member of Allen’s community was travelling via snowmobile over the sea ice when his vehicle crashed through. The man survived, but everyone has been shaken by the incident. “There’s a  
105 lot of questioning in people’s minds: can we trust the years of knowledge that have been passed down to us about where it’s safe to travel, because things are just changing so much,” says Allen.

Throughout the Arctic, climate change is  
110 having a profound effect on the traditional culture and well-being of communities, according to Cunsolo. “You have people who, for hundreds of years, have relied on the cold and the snow for all aspects of culture, for language, for knowledge  
115 sharing, for connection to land and resources and for food security,” she says. “It’s a really deep, existential identity impact that the communities are experiencing.”

It may seem like a local problem, but the  
120 threat caused by melting ice will reverberate around the world. According to the Intergovernmental Panel on Climate Change (IPCC), if Earth warms by 1.5°C, Arctic meltwater will push up global sea levels by between 0.26 and 0.77 metres by the end of the  
125 century. At 2°C of warming, an additional 10 centimetres of sea level rise can be expected, with negative consequences for 10 million people. The long-term threat is even more dramatic. For example, collapse of the Greenland ice sheet, which  
130 could be triggered by between 1.5°C and 2°C of warming, would cause a 7-metre rise in global sea levels.

### Sea level rise

Less dramatic rises are already having  
135 devastating effects in low-lying regions, including the tropical island nation of Vanuatu in the south Pacific. Esther Peter at the Vanuatu Meteorological and Geohazards Department says it is affecting access to water on the archipelago, by polluting  
140 freshwater wells with salt water. It is also damaging infrastructure. “[On the island of Efate] the sea is reaching the tar-sealed roads during high tides,” she says. Vanuatu’s solution is drastic. In December 2022, it announced plans to relocate “dozens” of  
145 villages over the next two years. “Climate displacement of populations is the main feature of our future,” the country’s climate change minister, Ralph Regenvanu, recently told the French news agency AFP. “We have to be ready for it and plan for  
150 it now.”

When 1.5°C has been breached, other low-lying nations and regions will increasingly face similar challenges. Vanuatu also provides a window on another problem set to become far worse for  
155 many of us: it is one of the countries most vulnerable to extreme weather events driven by climate change. In 2015, Cyclone Pam hit the archipelago. This category 5 cyclone brought gusts of wind exceeding 300 kilometres per hour and 4-metre-high tides that  
160 swept away entire villages. The storm destroyed household “gardens”, traditional allotments that most islanders rely on for growing fruit and vegetables, wiping out 90 per cent of the nation’s food crops. This was followed by a severe drought  
165 that lasted for months, exacerbating food and water shortages.

170 People in remote villages were pushed to near  
starvation, says Amy Savage, who studied the  
aftermath of the cyclone and drought and now works  
for the World Health Organization. "They were  
really, really badly affected by that drought," she  
says. "There were three or four months [where  
some] people reported living on one food item, like  
manioc [cassava] or bananas – that is all they had to  
eat for months." She warns that escalating climate  
change looks set to permanently change Vanuatu's  
dietary culture. In the face of extreme storms and  
unpredictable growing seasons, families are  
increasingly abandoning home-grown produce in  
favour of imported food such as instant noodles.  
Such a shift brings with it an increased risk of  
conditions like obesity, diabetes and cardiovascular  
disease. "I think we need to see climate change as  
less of an abstract concept and understand that real,  
individual people are being affected," says Savage.

Beyond 1.5°C warming, those people won't  
just be in remote locations. Increasingly, people in  
Western nations will start to feel the force of climate  
change as threats from flooding, drought and  
wildfires grow. Food security will become a pressing  
problem: in the UK, for example, MPs were already  
warning in 2017 that 20 per cent of the country's  
fruit and vegetables are imported from countries  
where climate change poses a significant risk to crop  
yields. What's more, Saleemul Huq at the  
International Centre for Climate Change and  
Development in Bangladesh believes many Western  
countries are far less prepared for warming beyond  
1.5°C than nations on the front line.

200 For some communities, however, it is already  
a reality. In Australia, 80 per cent of the Great  
Barrier Reef has been hit by severe bleaching as a  
result of rising ocean temperatures. Right now, the  
reef tends to have a few years of breathing space  
between bleaching events, allowing some fast-  
growing coral species to partially recover. The  
bleaching events of 2016 and 2017 left parts of the  
reef "decimated", according to Craig Stephen, who  
owns Mike Ball Dive Expeditions in Queensland,  
which runs diving trips for tourists. But, he adds,  
after two or three years of regrowth it looked  
"fantastic". This seeming recovery is an illusion.

### Goodbye coral reefs?

215 Bleaching events are happening more often,  
says Terry Hughes at James Cook University,  
Australia. "What used to be an unprecedented event

is now becoming much more frequent and severe."  
To make matters worse, the fastest-growing coral  
species – like staghorn and table corals – are also the  
most vulnerable to spikes in temperatures. "The mix  
of coral species is changing at breakneck speed," says  
Hughes. "The reefs at 1.5°C of global average  
warming will be quite different from the reefs of  
today and the reefs of 30 years ago." If warming  
reaches 2°C, coral reefs may cease to exist entirely,  
according to the IPCC. This would throw a thriving  
tourism industry into an existential crisis. "Certainly,  
for businesses like ours, we would have to adapt and  
change," says Stephen. "There's no ifs or buts about  
that."

Coral die-off is just one of several "tipping  
points" we risk triggering by overshooting 1.5°C of  
warming. These are changes that can't be undone,  
even if temperatures subsequently come back down.  
Top of the list, along with the demise of coral, are  
widespread thawing of permafrost and the collapse  
of Arctic ice sheets, including the Greenland one. It is  
very difficult for scientists to judge exactly when a  
tipping point has been breached – some may have  
been passed already. The argument for cutting  
emissions and slowing global temperature rise is  
about minimising the risk of passing these triggers  
(see "What's in a number?"). "You don't want to get  
into this unknown territory," says Richard Betts at  
the UK's Met Office. "If you can't be certain, but the  
impacts are profound, then you want to avoid testing  
it."

With the 1.5°C temperature goal slipping out  
of reach, this makes efforts to reverse the direction  
of climate change even more urgent. In the coming  
decades, technologies that suck excess carbon  
dioxide out of the environment promise to be big  
business – from machines that extract it from the air  
to solvents that "wash" it from ocean water. Pulling  
the temperature rise back down below 1.5°C will  
rely on getting these to work at scale. We will also  
need the world's forests, peatlands and other carbon  
sinks working overtime to remove CO<sub>2</sub>. Yet, as the  
climate warms, there is a growing threat that these  
natural carbon stores start to collapse, warns Betts.  
Wildfires can wipe out forests, for example, and  
droughts can dry out wetlands, hampering their  
ability to lock away carbon.

How realistic is it, then, to expect we can wind  
back the climate clock after exceeding 1.5°C? It is  
"theoretically possible", says Betts. "But the more we  
overshoot, the harder it will be to get back."

Source: <https://www.newscientist.com/article/mg25834420-100-the-uncomfortable-reality-of-life-on-earth-after-we-breach-1-5c/>

## Explore the text:

1. Find out why it difficult for scientists to predict when exactly global warming will exceed 1.5°C, and why it is complicated for them to communicate about what they know.
2. **Ice caps melting:** Explain how climate change is already changing the living conditions of the inhabitant of Arctic regions, and how the melting of the ice caps could have a more global impact if temperatures keep rising.
3. **Sea level rise:** What have been the consequences of global warming for Vanuatu so far? What could happen globally if the 1.5°C threshold is breached?
4. **Goodbye coral reefs?** What are the consequences of warming oceans on Australian coral reefs? Why are coral reefs a good example to illustrate the notion of a “tipping point”? After reading the text, can you explain this concept in your own words?
5. **It is “theoretically possible”:** What are the different solutions proposed in the article to limit and control the rise in Earth’s temperature? What are the limits of such solutions?

## PHONOLOGY:

Can you recognize these words from their pronunciation? Practice pronouncing them properly.

1. /'klaɪmæt/ : .....
2. /'gləʊbəl/ : .....
3. /rɪ'mɪʃənz/ : .....
4. /'fəʊsəl, fjuəlz/ : .....
5. /kɑ:bən dar'ɒksaɪd/ : .....
6. /'tɛmpərɪtʃəz/ : .....
7. /flʌd/ : .....
8. /draʊt/ : .....
9. dɪ'nærəl/ : .....
10. /'glæsiər/ or /'glɛɪsiər/ : .....

	monophthongs				diphthongs			Phonemic Chart voiced unvoiced
	i:	ɪ	ʊ	u:	ɪə	eɪ		
	sheep	ship	good	shoot	here	wait		
VOWELS	e	ə	ɜ:	ɔ:	ʊə	ɔɪ	əʊ	
	bed	teacher	bird	door	tourist	boy	show	
	æ	ʌ	ɑ:	ɒ	eə	aɪ	aʊ	
	cat	up	far	on	hair	my	cow	
CONSONANTS	p	b	t	d	tʃ	dʒ	k	g
	pea	boat	tea	dog	cheese	June	car	go
	f	v	θ	ð	s	z	ʃ	ʒ
	fly	video	think	this	see	zoo	shall	television
	m	n	ŋ	h	l	r	w	j
	man	now	sing	hat	love	red	wet	yes

The 44 phonemes of Received Pronunciation based on the popular Adrian Underhill layout

adapted by EnglishClub.com

## GRAMMAR FOCUS: the conditionals

Fill in the blanks to revise how conditionals work in English

1.

- *If we breach 1.5°C, .....*
- *Low-lying nations like Vanuatu will face terrible challenges if.....*

<b>First conditional: IF + ..... → ..... + infinitive</b>
---

2.

- *If we managed to control our CO2 emissions, we.....*
- *Inuit people wouldn't be so worried about travelling on sea ice if.....*

<b>Second conditional: IF + ..... → ..... + infinitive</b>
--

3.

- *If we had understood the problems raised by global warming sooner, .....*
- *Many extreme weather events would have been avoided if.....*

<b>Third conditional: IF + ..... → ..... + past participle</b>
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**PRACTICE:** Rephrase the following sentences, using *if* each time.

1. We have to get serious about climate change today because it will be too late for our children to do so tomorrow.
2. Companies ought to pay more attention to their carbon footprint. It would help our country reach net zero emissions.
3. Two degrees more and we jeopardize the food supply for hundreds of millions of people.
4. The longer we fail to act, the worse it gets.
5. 250 years ago, James Watt came up with a machine that was powered by steam that was produced by burning coal, and it was the starting point of global warming.
6. We can plant hundreds of millions of trees and halt and reverse deforestation by 2030.
7. Summits alone cannot solve climate change. Otherwise, we wouldn't have needed 25 previous COP summits to get where we are today.
8. We should have taken better care of our oceans. They would be cleaner now.

# 1,500 policies to fix global warming were implemented in 41 countries. Here are the ones that worked best

By Laura Paddison and Ella Nilsen, CNN - Thu August 22, 2024

As the need for effective global climate action becomes ever more urgent, a “first-of-its-kind” analysis has identified policies around the world that have done the most to rein in planet-heating pollution — with some surprising results.

Researchers from several European climate institutions analyzed the effectiveness of 1,500 climate policies across 41 countries over the past two decades, in a study published Thursday in the journal Science.

They found just 63 “success stories” — standalone policies or combinations that achieved large cuts in climate pollution. While the relatively small number may be “sobering,” the researchers said in a statement, the findings provide a blueprint for what works.

The researchers trawled through vast amounts of climate data to find countries that had significant downturns in pollution — average reductions of 19% — in their building, electricity, industry and transportation sectors between 1998 and 2022. Then they mapped these against the policies those countries introduced or strengthened during the same period.

“We basically do the reverse of what other people have done before,” said Nicolas Koch, an environmental economist at the Mercator Research Institute on Global Commons and Climate Change in Germany, and a lead author on the study. “We first look at (climate pollution) effects, and then try to explain the effects with policies.”

Some of the findings were unexpected, Koch told CNN.

When it came to popular climate policies, such as bans on new coal-fired power plants or gas-guzzling cars, “the surprising finding, really, is that we never detect successful large emission reductions if these policy tools are used alone,” he said.

That’s not to say they shouldn’t be implemented, Koch added, but rather they need to be accompanied by other measures, like taxes or price incentives.

Bans on their own “are not credible if the phase-out plan is just out there,” Koch said. But if policy makers also introduce additional measures — a gas-powered car ban plus a climate tax on fuel — then it becomes more credible and changes investor and consumer expectations, he said.

Policy combinations, rather than standalone policies, had the greatest level of success, according to the study.

The United States, for example, experienced a significant reduction in planet-heating pollution from its transportation sector after the 2008 financial crisis. This was due to a mix of tax breaks for low-carbon vehicles as well as a reform in fuel efficiency standards, the study found.

“That combination turned out to be effective ... so this really a good news story for the US,” Koch said.

It’s a model Democrats replicated on steroids in 2022 when they passed President Joe Biden’s climate law; pairing a massive amount of tax breaks for electric vehicles, solar panels and energy-efficient home appliances, along with with federal rules to slash emissions from the most-polluting sectors: natural gas and oil, transportation and power generation.

The UK made a big cut in planet-heating pollution from electricity in 2015 and 2016 following a coal phase-out plan, a carbon minimum price for UK power producers, stricter air pollution standards and subsidies for renewable energy.

The policy that did show big climate impacts when implemented alone is arguably one of the least socially popular: taxation.

But a tax on carbon can be complemented with more socially acceptable policies, Koch said, to ensure the burden doesn’t fall on those least able to shoulder it.

Carbon taxes are widely unpopular in the US Congress, but there have been several bills introduced that would implement a “carbon border adjustment tax,” which would tax imported products based on how much pollution they emitted in the country where they were created. Those bills are seen as a response to a similar EU measure passed last year.

Which policies work best varies across countries and sectors and follow-up research is needed to better understand how to design climate policy mixes that work in specific contexts, Koch said.

“This is the most sophisticated study to date,” said Michael Grubb, a professor of international energy and climate change at University College London, who was not involved in the research. “It’s

95 an important step forward in analysis of ‘what works,’” he added.

However, he added, the focus only on big emissions cuts means “they miss the impact of thousands of smaller efforts globally.”

100 Hanna Fekete, a co-founder of the NewClimate Institute who was also not involved in the research, said the study provides yet more evidence that “current climate action is insufficient.”

105 Even if the most successful policies implemented so far were scaled up to a global level, it would still not close the gap between where emissions are heading and where they need to be in order to rein in catastrophic warming, she said.

110 She called on countries to develop a clear vision of where they want to be in 30 or 40 years time, “and then really implement policies today and make them future proof.”

**Source :** [https://edition.cnn.com/2024/08/22/climate/climate-policies-review-coal-cars/index.html?iid=cnn\\_buildContentRecirc&end\\_recirc](https://edition.cnn.com/2024/08/22/climate/climate-policies-review-coal-cars/index.html?iid=cnn_buildContentRecirc&end_recirc)

**Explore the text:**

What policies worked best? List them.

What policies did not work so well? Can you explain why they did not?

## Can human rights laws contribute to fighting climate change?

### LISTENING – Is human rights law the best way to fight climate change?

Countries and institutions can find themselves in court for failing to meet their climate protection commitments — a development made possible by the 2015 Paris Climate Agreement. Environmental activists often emerge victorious from the legal proceedings.

#### Watch the video and pick out information.

<https://www.dw.com/en/is-human-rights-law-the-best-way-to-fight-climate-change/video-59662602>

⇒ Governments

#### a. Pick out the following information

	Pakistan	The Netherlands (Urgenda)
Claim / Argument made		
Court's decision		

#### b. What is the link between human rights laws and climate change?

Example 1

Example 2

Bottom line

#### c. Pick out information about the following cases:

Germany	
Australia	
Petition with the UN Committee on the rights of the child	

⇒ Companies – What happened to Shell?

## READING - Ban fossil fuel ads to save climate, says UN chief

5 June 2024 - Matt McGrath and Mark Poynting

The world's fossil fuel industries should be banned from advertising to help save the world from climate change, the head of the United Nations said on Wednesday.

5 UN Secretary General António Guterres called coal, oil and gas corporations the “godfathers of climate chaos” who had distorted the truth and deceived the public for decades.

10 Just as tobacco advertising was banned because of the threat to health, the same should now apply to fossil fuels, he said.

15 His remarks were his most damning condemnation yet of the industries responsible for the bulk of global warming. They came as new studies showed the rate of warming is increasing and that global heat records have continued to tumble.

20 Data from the EU's climate service confirms that each of the past 12 months set a new global temperature record for the time of year. The high temperatures were driven by human-caused climate change, although they were also given a small boost by the El Niño climate phenomenon.

25 While a fading El Niño should soon bring a pause to the record-breaking sequence of months, temperatures will continue to rise in the long-term due to emissions of planet-warming gases from human activities.

30 Last year was the hottest on record and the World Meteorological Organization (WMO) said on Wednesday that the record could fall again as soon as this year.

A group of around 50 leading scientists separately reported that the rate of global warming caused by humans has continued to increase.

35 They found that ongoing high emissions of warming gases mean the world is moving closer to breaching the symbolic 1.5C warming mark on a longer-term basis.

40 To try to avert this outcome, the UN Secretary General has called for more rapid political action on climate change, and a “clampdown” on the fossil fuel industry.

45 “We must directly confront those in the fossil fuel industry who have shown relentless zeal for obstructing progress – over decades.”

He said many in the oil, gas and coal industries had “shamelessly greenwashed” with lobbying, legal action and massive advertising campaigns.

“I urge every country to ban advertising from fossil fuel companies,” he told an audience in New York.

“And I urge news media and tech companies to stop taking fossil fuel advertising.”

55 In response, representatives of fossil fuel groups said they were committed to reducing their emissions.

60 “Our industry is focused on continuing to produce affordable, reliable energy while tackling the climate challenge, and any allegations to the contrary are false,” said Megan Bloomgren, Senior Vice President of Communications at the American Petroleum Foundation.

UN Secretary General António Guterres has long been a critic of fossil fuel use, and is now calling for global ban on advertising by coal, oil and gas producers.

70 The UK Advertising Standards Authority has previously pledged to clamp down on misleading environmental claims, while the European Union recently announced a new law to tackle the problem.

Mr Guterres' call for an outright ban on all fossil fuel advertising goes further - but it has no legal standing, and the UN has no means of enforcing the idea.

75 However, it will be seen as a boost for campaigners who have fought against sponsorship and advertising from coal, oil and gas companies.

80 Both the Hay and Edinburgh book festivals have recently suspended sponsorship from investment company Baillie Gifford following controversy over links to fossil fuel firms.

Sport is one of the biggest areas of fossil fuel advertising and sponsorship, with football having a long association with oil and gas producers.

85 Concerns over human health have seen alcohol and tobacco sponsorship banned in football in the past, and green campaigners will be hoping that the support of Mr Guterres will see fossil fuels go the same way.

90 In his address, Mr Guterres stressed that time was of the essence, with the impacts of rising temperatures already being felt - such as the recent deadly heatwaves in Asia or the floods in South America.

95 Deadly floods hit Brazil last month, and scientists at the World Weather Attribution group said the



heavy rain was made at least twice as likely by climate change

100 The record-breaking global heat means that average temperatures over the past 12 months have been 1.63C above "pre-industrial levels" of the late 1800s, according to Copernicus data.

"We are living in unprecedented times," says Carlo Buontempo, director of Copernicus.

105 This does not constitute a breach of the Paris climate agreement, in which nearly 200 countries pledged to try to keep temperature rises below 1.5C, in order to try to avoid some of the worst impacts of climate change.

110 That is because the Paris agreement is generally understood to mean a 20-year average - to smooth out natural variability. Taken as a whole, the past decade was about 1.2C warmer than pre-industrial levels.

115 Line graph showing rolling 365 day average of global air temperatures. For the first time on record, this has passed 1.5C for the year to date, and now sits at 1.63C. Temperatures have increased since the 1940s, where warming was around 0.2C.

120 But a new study released today by a group of leading climate scientists highlighted how close the world is getting to a long-term breach of the 1.5C mark.

125 They estimate that from the start of 2024 the world could only emit around 200 billion more tonnes of carbon dioxide (CO2) for a 50/50 chance of keeping warming to 1.5C - down from 500 billion tonnes at the beginning of 2020.

At current rates of emissions, this "carbon budget" could be exhausted by 2029 - although the world would probably not pass the long-term 1.5C mark until a few years later, because of warming effects from greenhouse gases other than CO2.

135 There are uncertainties about how exactly the climate system will react to these factors, and of course whether countries make urgent cuts to emissions.

"We have a bit of control over this as a society," says lead author Prof Piers Forster, director of the Priestley Centre for Climate Futures at the University of Leeds.

Despite the gloom, there has been some recent progress, with particularly rapid growth in renewable wind and solar electricity.

145 Greenhouse gas emissions are also showing signs of plateauing - but they are still at record highs.

They need to fall quickly if global targets have a chance of being met, with every fraction of a degree of warming worsening climate impacts.

150 "Every degree matters; every tenth of a degree matters," says Ko Barrett, WMO Deputy Secretary General.

"The difference between 1.5C and say 2C could mean [...] dire consequences, for coastal communities, for fragile ecosystems, and the biodiversity that is contained within them, and for glaciers and the frozen parts of the world."

Source : <https://www.bbc.com/news/articles/cv22vl99vwro>

### **READING Climate change: Seven ways to spot businesses greenwashing**

**Most of us are trying to be greener and for some that means seeking out brands and companies that are environmentally friendly. But how can you check firms really are as green as they make out?**

Greenwashing - branding something as eco-friendly, green or sustainable when this is not the case - misleads consumers into thinking they are helping the planet by choosing those products.

And businesses are being held to account on this in the way they advertise. But what do customers need to look out for to spot greenwashing?

To read the article, visit <https://www.bbc.com/news/business-59119693>

## WRITING

In today's world, companies often claim to be environmentally friendly, but sometimes these claims are not true. This is called greenwashing. At the same time, climate change affects people's lives, and some believe that human rights laws should be used to protect people from its effects.

As a citizen, you have decided to write an opinion piece to express your concerns.

**Option 1** – you want to make people aware of greenwashing and companies' techniques to mislead you.

**Option 2** – you want to encourage people to sue their governments so that they take action.

## GRAMMAR FOCUS: Modulating comparisons

Look at the following examples:

1. Some materials have a **much** higher carbon footprint than plastic.
2. Our knowledge is growing **even** faster.
3. The electricity would be from **far** more expensive forms.
4. With **ever** stronger research since then, the scientific consensus is likely to have risen.
5. US power stations are switching to **much** cheaper shale gas
6. It has become **a lot** harder to make money from plastic recycling.

You can modulate the comparison by using: *much – a lot – far – a bit – a little – slightly ...*

Practice: Use these expressions to comment on how climate change impacts the population.

*Find more information and vocabulary on this subject on eCampus*

### READING Global fresh water demand will outstrip supply by 40% by 2030, say experts

Fiona Harvey - 17 Mar 2023

#### **Landmark report urges overhaul of wasteful water practices around world on eve of crucial UN summit**

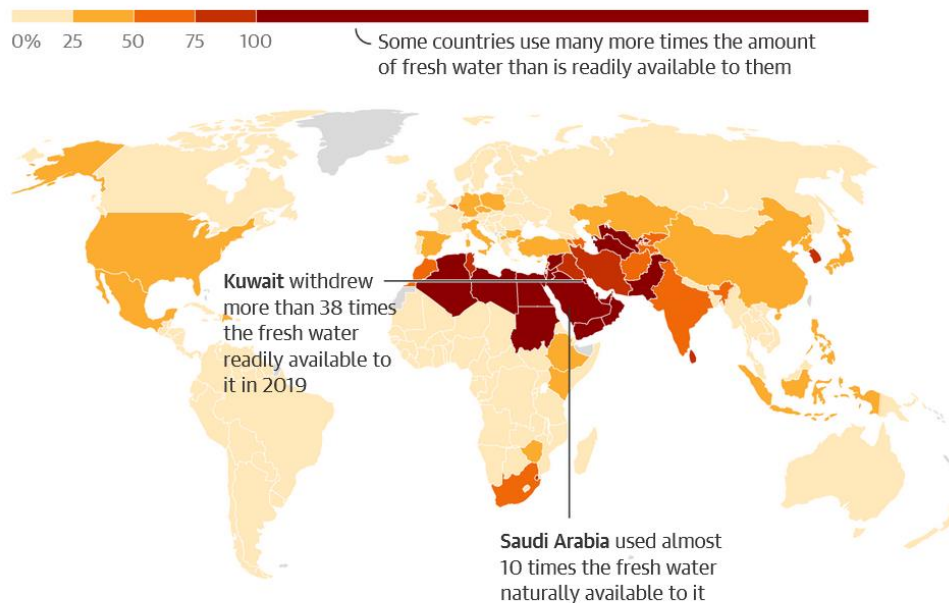
The world is facing an imminent water crisis, with demand expected to outstrip the supply of fresh water by 40% by the end of this decade, experts have said on the eve of a crucial UN water summit.

- 5 Governments must urgently stop subsidising the extraction and overuse of water through misdirected agricultural subsidies, and industries from mining to manufacturing must be made to overhaul their wasteful practices, according to a landmark report on the economics of water.
- 10

Nations must start to manage water as a global common good, because most countries are highly

- dependent on their neighbours for water supplies, and overuse, pollution and the climate crisis threaten
- 15 water supplies globally, the report's authors say. Johan Rockstrom, the director of the Potsdam Institute for Climate Impact Research and co-chair of the Global Commission on the Economics of Water, and a lead author of the report, told the Guardian the world's
- 20 neglect of water resources was leading to disaster. "The scientific evidence is that we have a water crisis. We are misusing water, polluting water, and changing the whole global hydrological cycle, through what we are doing to the climate. It's a triple crisis."

#### **Water stress: freshwater withdrawal as a proportion of available freshwater resources, 2019**



Guardian graphic. Source: Food and Agriculture Organization of the United Nations

- 25 Rockstrom's fellow Global Commission on the Economics of Water co-chair Mariana Mazzucato, a professor at University College London and also a lead author of the report, added: "We need a much more proactive, and ambitious, common good approach. We
- 30 have to put justice and equity at the centre of this, it's not just a technological or finance problem."
- The report marks the first time the global water system has been scrutinised comprehensively and its value to countries – and the risks to their prosperity if
- 35 water is neglected – laid out in clear terms. Like with the Stern review of the economics of the climate crisis in 2006 and the Dasgupta review of the economics of biodiversity in 2021, the report authors hope to highlight the crisis in a way that policymakers and
- 40 economists can recognise.

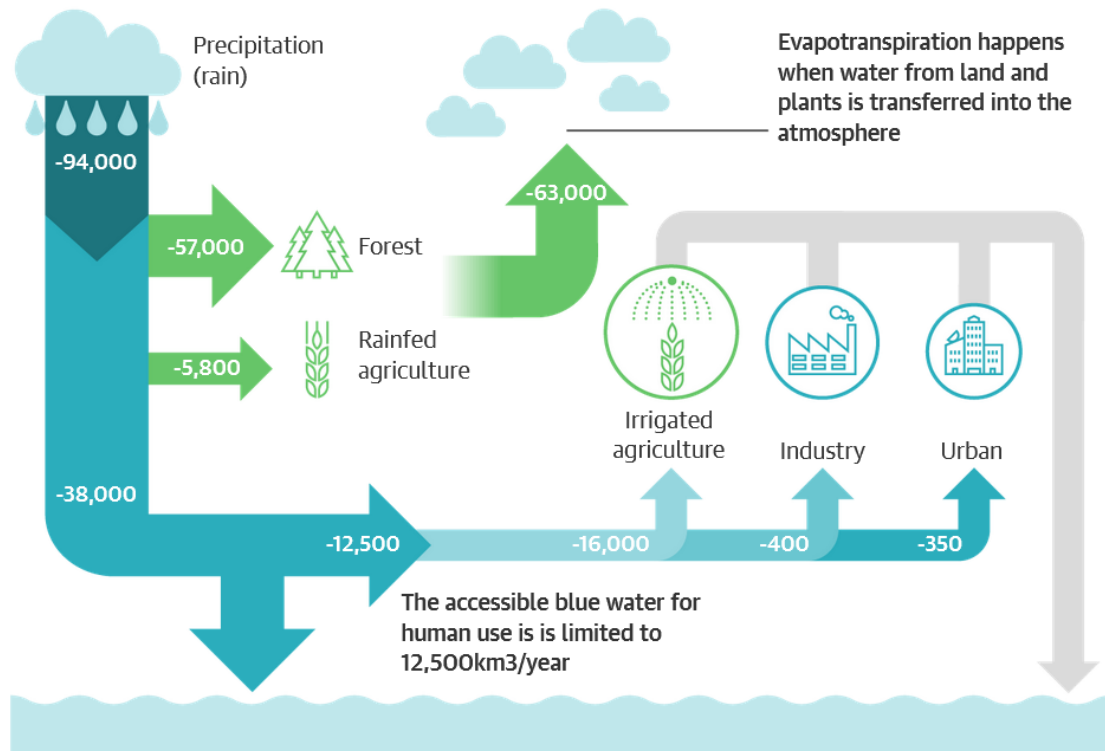
- Many governments still do not realise how interdependent they are when it comes to water, according to Rockstrom. Most countries depend for about half of their water supply on the evaporation of
- 45 water from neighbouring countries – known as "green" water because it is held in soils and delivered from transpiration in forests and other ecosystems, when plants take up water from the soil and release vapour into the air from their leaves.
- 50 The report sets out seven key recommendations, including reshaping the global governance of water resources, scaling up investment in water management through public-private partnerships, pricing water properly and establishing "just water
- 55 partnerships" to raise finance for water projects in developing and middle-income countries.

## Human survival depends on a sustainable water cycle for both blue and green limits

Figures mentioned below are km<sup>3</sup>/yr

■ 'Blue water' refers to surface and ground water

■ 'Green water' is what is available to plants from the soil



Guardian graphic. Source: Global Commission on the Economics of Water

More than \$700bn (£575bn) of subsidies globally go to agriculture and water each year and these often fuel excessive water consumption. Water leakage must also be urgently addressed, the report found, and restoring freshwater systems such as wetlands should be another priority.

Water is fundamental to the climate crisis and the global food crisis. "There will be no agricultural revolution unless we fix water," said Rockstrom. "Behind all these challenges we are facing, there's always water, and we never talk about water."

Many of the ways in which water is used are inefficient and in need of change, with Rockstrom pointing to developed countries' sewage systems. "It's quite remarkable that we use safe, fresh water to carry excreta, urine, nitrogen, phosphorus – and then need to have inefficient wastewater treatment plants that leak 30% of all the nutrients into downstream aquatic ecosystems and destroy them and cause dead zones. We're really cheating ourselves in terms of this linear,

waterborne modern system of dealing with waste. There are massive innovations required."

The UN water summit, led by the governments of the Netherlands and Tajikistan, will take place in New York on 22 March. World leaders are invited but only a few are expected to attend, with most countries to be represented by ministers or high-ranking officials. It will mark the first time in more than four decades the UN has met to discuss water, with previous attempts stymied by governments reluctant to countenance any form of international governance of the resource. Henk Ovink, a special envoy for international water affairs for the Netherlands, told the Guardian the conference was crucial. "If we are to have a hope of solving our climate crisis, our biodiversity crisis and other global challenges on food, energy and health, we need to radically change our approach in how we value and manage water," he said. "[This] is the best opportunity we have to put water at the centre of global action to ensure people, crops and the environment continue to have the water they need."

### Seven calls to action on water

1. Manage the global water cycle as a global common good, to be protected collectively and in our shared interests.
2. Ensure safe and adequate water for every vulnerable group, and work with industry to scale up investment in water.

3. Stop underpricing water. Proper pricing and targeted support for the poor will enable water to be used more efficiently, more equitably, and more sustainably.
4. Reduce the more than \$700bn of subsidies in agriculture and water each year, which often fuel excessive water consumption, and reduce leakage into water systems.
5. Establish “just water partnerships” which can mobilise finance for low- and middle-income countries.
6. Take urgent action this decade on issues such as restoring wetlands and depleted groundwater resources, recycling the water used in industry, moving to precision agriculture that uses water more efficiently, and having companies report on their “water footprint”.
7. Reform the governance of water at an international level, and include water in trade agreements. Governance must also take into account women, farmers, indigenous people and others in the frontline of water conservation.

Source : <https://www.theguardian.com/environment/2023/mar/17/global-fresh-water-demand-outstrip-supply-by-2030>

## LISTENING –

Listen to this instructive video about where water comes from and take notes on the essential information  
<https://youtu.be/sYGS0ouroxQ>

1. Where does drinkable water come from?
2. What is problem is agriculture faced with?
3. Water pollution: where does it come from and what are its consequences?
4. So what do we do about it? Note down some examples of how water can be protected.

## PHONOLOGY – [ɪ], [i:] or [aɪ] ?

Put the following words in the correct column.

Aquifer – stream – salinity – saline – pipe – drill – fertilizer- herbicide – liquid – nitrate –  
leak – damage – algae -violation - marine

[ɪ] (ship)	[i:] (sheep)	[aɪ] (my)

## SPEAKING: Call to action – group work.

In groups of 2 or 3 students, explore the issue of water pollution, then focus on one particular problem that needs solving.

Prepare a short presentation of the problem you have identified and **propose solutions**. Be convincing!

Present your “call to action” to the class.

# Plastic pollution

*Find more information and vocabulary on this subject on eCampus*

## LISTENING - What is Microplastic?

<https://youtu.be/WvBEiyQe8vQ>

### ⇒ The origins of plastic

3,500 years ago	
Mid 19th and 20th centuries	

### ⇒ Information about today's plastic

Advantage of man-made plastic:

⇒

<b>Step 1</b>		<b>Crude oil</b>	<b>Natural gas</b>
<b>Step 2</b>			
<b>Step 3</b>			
<b>Step 4</b>			
<b>What happens next?</b>			

### ⇒ The evolution of plastic use

**What things are particularly detrimental? Give examples. What consequences do they have?**

## ⇒ Solutions

How to reduce the single use plastics we use:

Scientific solutions to break down plastic:

1.

2.

Changes to the production of plastic: what natural resources are used and what for?

## Solutions, solutions, solutions

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### Listening 1 –

All of the plastic that has ever been created still exists in some form. Some companies have created products that will break down in certain conditions. Others have produced enzymes that do the work for us.

<https://www.youtube.com/watch?v=9q29nu2T0Ko>

### Listening 2 - Meet The Plastic-Eating Worms | Planet Fix

These worms can eat plastic. Not only that, but they can digest it too! In the fifth and final episode of 'Planet Fix', we speak to the scientists exploring how nature is fighting back against one of the world's biggest polluters.

<https://www.youtube.com/watch?v=Z-HHbU0zoXk>

SPEAKING - Look for other solutions to solve plastic pollution and present the best initiative to the class.

## Recycling and Packaging

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(More documents on eCampus)

### *Food giants respond to worries over packaging*

*By David Silverberg – 4 May 2021*

When Rebecca Prince-Ruiz recalls how her eco-friendly movement Plastic Free July has progressed over the years, she can't help but smile. What began in 2011 as 40 people committing to going 5 plastic-free one month a year has gained

momentum to 326 million people pledging to adopt this practice today.

"I've seen that uptick in interest every year," says Ms Prince-Ruiz, who is based in Perth, 10 Australia, and author of Plastic Free: The Inspiring



## Story of a Global Environmental Movement and Why It Matters.

“These days, people are taking a hard look at what they are doing in their lives and how they can seize an opportunity to be less wasteful,” she says.

Since 2000, the plastics industry has manufactured as much plastic as all the preceding years combined, a World Wildlife Fund report in 2019 found. “The production of virgin plastic has increased 200-fold since 1950, and has grown at a rate of 4% a year since 2000,” the report says.

This has spurred companies to replace single-use plastic with biodegradable and compostable packaging designed to dramatically reduce the toxic footprint plastics leave behind.

In March, Mars Wrigley and Danimer Scientific announced a new two-year partnership to develop compostable packaging for Skittles in the US, estimated to be on shelves by early 2022.

It involves a type of polyhydroxyalkanoate (PHA) that will look and feel the same as plastic, but can be thrown into the compost where it will break down, unlike regular plastic that takes anywhere from 20 to 450 years to fully decompose.

Danimer Scientific’s polymer product is made from canola oil, and it acts similarly to wood, meaning it breaks down when bacteria interact with it. “PHA goes away naturally and is still a very strong material for all types of products,” says Stephen Croskrey, chief executive of Danimer Scientific, based in the US state of Georgia.

Alastair Child, Mars Wrigley vice-president for global sustainability, says: “Our vision is to support a circular economy where packaging never becomes waste and by 2025 we plan to reduce our virgin plastic use by 25% and for 100% of our plastic packaging to be reusable, recyclable or compostable.”

Hindering the widespread use of eco-friendly packaging such as PHA is the cost. It can be three to five times as expensive to manufacture as regular plastic.

But that hasn’t stopped companies such as California-based Mango Materials and London-

based Polymateria from dedicating their businesses to producing products that biodegrade over a shorter period of time.

For example, Polymateria’s Cycle+ plastic is biodegradable after three years and is still able to be recycled during its usable lifetime. Their clients range from East Africa businesses making bread bags to Extreme E, a new electric racing series that uses Polymateria products for cups and food packaging.

The plastics industry should wake up to the growing trend of alternative packaging, says Niall Dunne, chief executive of Polymateria. “We’ve seen how consumer pressure is saying to the big guys that they have to be on board [with reducing their plastic production] and to be more transparent and authentic in this important conversation,” Mr Dunne says.

Meg Sobkowicz, associate professor of plastics engineering at the University of Massachusetts Lowell, says that kind of pressure has already worked to push the plastics industry to steer away from the toxic BPA ingredient that was commonly found in reusable plastic bottles. “I think we’re coming around to where public concern is pushing them to tip the scales in favour of environmentally friendly packaging, despite its costs.”

Forward-thinking engineers plan to get even more creative with their biodegradable packaging solutions, such as a Scottish research team using waste material from shellfish to make a new type of packaging. And designer Alice Potts has blended food waste with flowers from London parks to craft a series of bioplastic face shields.

“We know we can’t do this alone,” says Mars Wrigley’s Alastair Child.

“Achieving a circular economy will take industry, governments, NGOs and consumers all working together. We would love to see more and more material and design innovations from which we can all learn come to market, but the most important thing is that we see a stronger commitment to closing the loop.

Source : <https://www.bbc.com/news/business-56770732>

**LISTENING: Recycling: What if things never, ever got thrown away?**

<https://www.bbc.com/news/av/uk-wales-55276055>

Listen to the video, make notes and learn about the circular economy

## PHONOLOGY: Word stress and long words

Identify the stressed syllables in the following words, then practice your pronunciation.

1. Sustainability
2. revolutionary
3. polypropylene
4. biodegradability
5. a synthetic compound
6. plastic consumption
7. single-use plastics
8. biodegradable bioplastic
9. non-reusable packaging
10. household recycling
11. reusable alternatives
12. renewable resources

## GRAMMAR FOCUS: *The more..., the more...*

See lesson on eCampus

**PRACTICE:** Can you rephrase these sentences, using *the more...* or *the less*, instead of “if” ?

1. If we consume more single-use plastics, the oceans will become more polluted with plastic debris, endangering marine life.
2. If we use more plastic packaging, landfills will overflow with non-biodegradable waste, posing a threat to the environment.
3. If we discard plastic items irresponsibly, our ecosystems will suffer from contamination and disruption.
4. If we manufacture fewer plastic products, fewer greenhouse gases will be released during production, helping combat climate change.
5. If we leave more plastic litter on beaches and coastal areas, it will find its way into the food chain through marine organisms, potentially harming human health.
6. If we generate less plastic waste, we will deplete fewer resources in manufacturing new plastics, promoting a more sustainable future.
7. If plastic pollution continues to accumulate in the oceans, it will become increasingly challenging to clean up and restore affected marine habitats.
8. If we better manage and reduce plastic waste through recycling and responsible consumption, we will have a better chance to preserve the health of our planet and of future generations.
9. If we become better at implementing sustainable practices, we will have a more significant positive impact on reducing plastic pollution
10. If we do better, we will achieve more in safeguarding our planet.

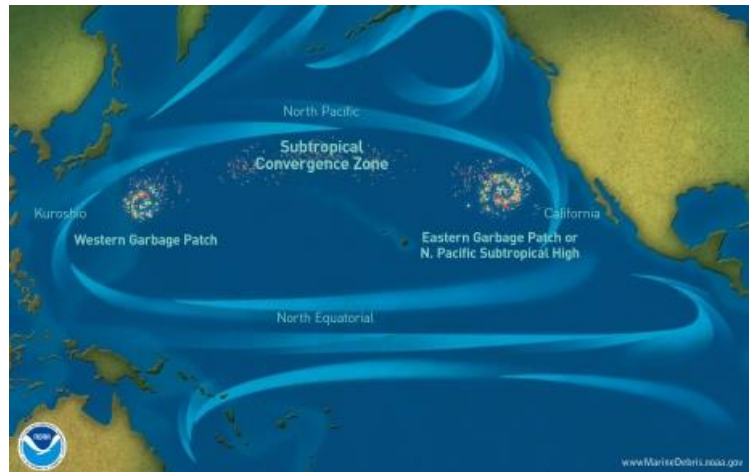
## **Document 1:**

### **What and Where Are Garbage Patches?**

Garbage patches are large areas of the ocean where litter, fishing gear, and other debris – known as marine debris – collects. They are formed by rotating ocean currents called “gyres.” You can think of them as big whirlpools that pull objects in. The gyres pull debris into one location, often the gyre’s center, forming “patches.”

There are five gyres in the ocean. One in the Indian Ocean, two in the Atlantic Ocean, and two in the Pacific Ocean. Garbage patches of varying sizes are located in each gyre.

The most famous of these patches is often called the “Great Pacific Garbage Patch.” It is located in the North Pacific Gyre (between Hawaii and California). “Patch” is a misleading nickname, causing many to believe that these are islands of trash. Instead, the debris is spread across the surface of the water and from the surface all the way to the ocean floor. The debris ranges in size, from large abandoned fishing nets to tiny microplastics, which are plastic pieces smaller than 5mm in size. This makes it possible to sail through some areas of the Great Pacific Garbage Patch and see very little to no debris.



### **The Great Pacific Garbage Patch**

The Great Pacific Garbage Patch is in the Pacific Ocean between Hawaii and California. It is the most well known patch. While some areas of the patch have more trash than others, much of the debris is made of microplastics (by count). Because microplastics are smaller than a pencil eraser, they are not immediately noticeable to the naked eye. It’s more like pepper flakes swirling in a soup than something you can skim off the surface. You may come across larger items, like plastic bottles and nets, but it’s possible to sail through some areas of a garbage patch and not see any debris at all. Garbage patches are huge! It’s difficult to determine an exact size as the trash is constantly moving with ocean currents and winds.

### **The Impact of garbage Patches on the Environment**

Garbage patches, especially the Great Pacific Garbage Patch, are far out in the middle of the ocean where people hardly ever go. Because they are so remote, it can be hard to study them. Scientists rarely get to see the impacts of garbage patches on animals first hand. So far, we know that marine debris found in garbage patches can impact wildlife in a number of ways:

**Entanglement and ghost fishing:** Marine life can be caught and injured, or potentially killed in certain types of debris. Lost fishing nets are especially dangerous. In fact they are often called “ghost” nets because they continue to fish even though they are no longer under the control of a fisher. Ghost nets can trap or wrap around animals, entangling them. Plastic debris with loops can also get hooked on wildlife – think packing straps, six-pack rings, handles of plastic bags, etc.

**Ingestion:** Animals may mistakenly eat plastic and other debris. We know that this can be harmful to the health of fish, seabirds, and other marine animals. These items can take up room in their stomachs, making the animals feel full and stopping them from eating real food.

**Non-native species:** Marine debris can transport species from one place to another. Algae, barnacles, crabs, or other species can attach themselves to debris and be transported across the ocean. If the species is invasive, and can settle and establish in a new environment, it can outcompete or overcrowd native species, disrupting the ecosystem.

### **Garbage Patches and Human Health**

We don't know whether, or how, garbage patches are impacting human health. Generally speaking, we know that humans may be exposed to microplastics from a number of sources, such as seafood, sea salt, tap water, beer, and even honey. However, we do not know how or if humans are impacted by this. Plastic microfibers can also be transported in the air and found in household dust (e.g., from furniture, carpet, clothing etc.), so exposure from seafood and other ocean sources may be small in comparison. The research community is actively exploring this issue.

Marine debris in garbage patches can have other impacts. For example, it may also cause damage to vessels and be a navigation hazard. Marine debris can be difficult to see in the ocean if it's floating below the water surface. A boat moving through the water can hit the debris, possibly resulting in costly vessel damage. Nets can become entangled in propellers and clog intakes.

### **What Happens If Nothing Changes?**

The answer is that we do not know. The locations and sizes of these garbage patches are not likely to change very much any time soon. However, the amount of debris may continue to grow as more and more debris enters our ocean each year. This growth will likely worsen current impacts on the environment, navigation, vessel safety, and the economy.

### **How Do We Get Rid of Garbage Patches?**

It may not be possible to entirely get rid of garbage patches. Some of the material will take a very long time to break down in the environment, while other materials, like plastics, may never fully go away. Large debris, like fishing nets, can be removed by people, but debris in the garbage patches is also mostly made up (by count) of plastic pieces smaller than 5mm in size. The debris is also continuously mixed by wind and wave action and is spread from the surface all the way to the ocean floor. Since these microplastics are so small in size, constantly being mixed, and spread out, it would be very difficult to remove them. Finding a cost effective technological solution which can take on these challenges is an extremely daunting task. Unfortunately, we will be dealing with this problem for the foreseeable future.

Here at the NOAA Marine Debris Program, we focus on marine debris prevention and removal from shorelines and coastal areas where debris is easier to pick up. Prevention is key to solving the marine debris problem over time. If you think about an overflowing sink, the first step before cleaning up the water is to turn the tap off. That is exactly how prevention works. By acting to prevent marine debris, we can stop this problem from growing.

To prevent marine debris, we need to understand where it is coming from. It's hard to identify specific sources, but we know that marine debris can enter our waterways and ocean in a variety of ways. Ineffective or improper waste management, dumping or littering, and stormwater runoff all lead to marine debris. If we want to "turn off the tap," everyone, including government, businesses, and people like you, will have to make some meaningful changes. We are the problem, and so we must also be the solution.

**Source : US department of Commerce – National Oceanic and Atmospheric Administration – Marine Debris Program.**

<https://marinedebris.noaa.gov/info/patch.html>

### **Document 2:**

**LISTENING : Can this project clean up millions of tons of ocean plastic?**

<https://youtu.be/fDHuPjx0aPQ>

**Listen and take notes on what you understand about Boyan Slat and his project, the Ocean Cleanup.**

## **Document 3 :**

### **READING :**

#### **What happened to The Ocean Cleanup — the system that would rid the oceans of plastic? Australian Broadcasting Corporation (ABC) - Science**

By environment reporter Nick Kilvert – Posted Thu 16 Mar 2023

Remember The Ocean Cleanup? It was the ambitious plan hatched by a young Dutch entrepreneur to “rid the world’s oceans of plastic”. If not, here’s a quick refresher:

In 2013, 18-year-old Boyan Slat dropped out of an aerospace engineering degree after a TEDx talk he presented the previous year went viral. In his talk, Mr Slat laid out his belief that a well-designed, floating system of nets could clean up the Great Pacific Garbage Patch — a concentrated gyre of plastic in the Pacific Ocean — “within five years”.

Riding the huge wave of publicity after his presentation made its way to YouTube, Mr Slat launched a crowdfunding campaign, then a feasibility study, and eventually began working on prototypes for a system to remove from the world’s oceans “90 per cent of floating plastic by 2040”. While few could question the principle, or Mr Slat’s belief in the project, many questioned its feasibility.

In the years since The Ocean Cleanup was launched, designs have been tested, failed, refined, and tested again. Mr Slat has jokingly referred to the failures as “unscheduled learning opportunities”.

In the meantime, the plastic problem in the world’s oceans has grown much worse.

So it’s worth checking back in on The Ocean Cleanup, and whether Mr Slat’s dream is any closer to becoming reality.

#### **Timeline of ‘unscheduled learning opportunities’**

##### **2018: Wind- and wave-powered System 001 — “Wilson”**

In 2018, after several years of testing, the System 001 prototype was launched — a 600-metre-long free-floating pipe with a net 3m deep suspended under it. Early results in the Pacific Ocean weren’t too promising: The net was being pushed in the current along with the plastic it was supposed to be collecting. Then, rough seas broke an 80m section of the net free, and the apparatus was towed back to port to be patched up.

Critics including physical oceanographer Kim Martini, who spoke to the ABC at the time, were worried the design had the potential to trap sea life, and become a floating piece of garbage itself.

##### **2019: System 001B**

After months of repairs, the same system was sent out with a sea anchor — similar to a parachute in the water — to slow it down and increase its plastic yield. But again, it didn’t hold onto much of the plastic. After a minor tweak, Mr Slat reported in October 2019 they had managed to recover a relatively small amount of plastic from the Great Pacific Garbage Patch for the first time. The idea with this free-floating system, which was fitted with GPS transmitters, was that a ship would visit every few months or longer to pick up plastic gathered in the nets. From the outset, Mr Slat pitched the idea of a passive system that would harness the currents of the ocean to move it around. That design was mainly about keeping down costs, Mr Slat explained at a press conference in Rotterdam in 2019.

“If you were to simply trawl for plastic, it would take [an] untold amount of time and be really expensive.”

##### **2021: System 002 — “Jenny”**

Given that pre-requisite, there was an interesting addition to the design launched in 2021.

Dubbed “Jenny”, System 002 had not one but two ships towing its 800m-long net through the water to give it “active propulsion”. The problem with the earlier passive design was that it just wasn’t gathering enough plastic. According to The Ocean Cleanup, to be effective at scale, it would have needed to deploy hundreds of passive systems, which was “unfeasible”. System 002 also had a long pocket added in the middle of the net where trash could be funnelled and accumulate. Speaking on the addition of ship power, Mr Slat said cleaning the oceans was the priority, rather than the method used.

In late 2021, and again in 2022, The Ocean Cleanup announced several large hauls of plastic had successfully been brought aboard the mother ship. Sceptics pointed out that the trash was too clean and well-preserved to have been floating in the Pacific for years. But The Ocean Cleanup countered that low nutrients and exposure to UV in the garbage patch explained the lack of growth or biofouling.

According to The Ocean Cleanup, it collected more than 153 tonnes of plastic from the Pacific in 2022.

##### **2023: System 002B and 03?**

Which brings us to now.

The Ocean Cleanup is currently testing System 002B, which includes, among other things, an onboard plastic compactor. And it says it’s in the process of scaling up to System 03, which will be three times the size of the 800m 002 prototype, and will likely be the model it rolls out at scale.

According to The Ocean Cleanup website, a system the size of 002 could theoretically clean up the garbage patch, but that it would be “impossibly expensive”. As well as refining the design of System 03, The Ocean Cleanup says it’s working on its “key performance indicator” — cost-to-cleaning ratio.

### **Will it work?**

In earlier iterations of the project, Mr Slat himself said that ship-driven nets would be prohibitively expensive — hence the attempts at a passive system.

According to Alistair McIlgorm from the Australian National Centre for Ocean Resources and Security, the cost to run the vessels in the new system would be enormous.

“The fundamental problem would be that ... the two vessels that he has, those fishing vessels, cost \$15-\$20,000 a day. For low-value plastic to recycle, that’s not sustainable,” Professor McIlgorm of the University of Wollongong said.

With 10 of those systems operating, day in, day out, the bills would stack up very fast.

But if Mr Slat’s viral TEDx talk showed anything, it was that he is very good at selling an idea.

Though many of the predictions from his original pitch have failed to materialise, The Ocean Cleanup has been incredibly successful at raising money.

In a single fundraising drive during the six months to May 2017, for example, it raised over \$32 million.

The group also has a legion of partnerships with global companies — among them banks, shipping companies and major soft-drink labels. It’s also the beneficiary of philanthropists and government sponsors.

So presuming it can find a way to overcome the hurdle of funding the operation, can it succeed?

One major problem it’s going to face, according to Professor McIlgorm, is that the garbage patch isn’t a uniform island of plastic.

Some places have lots of plastic while other areas are sparse.

“[But] if the plastic density was a tenth of what it is in those [Ocean Cleanup] videos, they’ll just be sailing around at sea wasting fuel and everything else.”

For their part, The Ocean Cleanup say they’re using computer modelling and sophisticated ship navigation technology to concentrate their efforts on the denser accumulations.

But the same issue arises the more they clean up. In other words, the more you clean, the less rubbish you’re going to be retrieving while burning through loads of fuel to do it.

Which leads to the third issue. If you stop, the patch will eventually fill up again.

The UN estimates at least 14 million tonnes of plastic enter the oceans every year.

“The trouble is, and the old saying is, if you depend on clean-up, you’ll be cleaning for the rest of your life. You have to get into prevention,” Professor McIlgorm said.

Amanda Reichelt-Brushett, a marine ecotoxicologist at Southern Cross University, said the work The Ocean Cleanup is doing in the Pacific can help get the ball rolling on the necessary prevention that is needed.

“Those type of images [of the clean up of the Great Pacific Garbage Patch] send messages to help change people’s behaviour,” Professor Reichelt-Brushett said.

“They’re really important visual messages that go towards awareness raising and dealing with the problem at its source.”

In turn, she said, the community can put pressure on industry and industry regulators.

“It’s important that [industry] take responsibility for that whole life cycle assessment process — cradle to cradle rather than cradle to grave.”

### **What does prevention look like?**

Although The Ocean Cleanup’s netting project in the Pacific gets the lion’s share of attention, its own statistics suggest it’s had far more success closer to shore.

It’s rolled out 10 “interceptors”, including trial versions, to collect rubbish in rivers in the US, Jamaica, Central America and Asia.

In 2022, The Ocean Cleanup collected more than 153 tonnes of garbage from the ocean. But its interceptors gathered nearly 840 tonnes from river systems.

Mr Slat has said that the interceptors are about “[turning off] the tap” and that The Ocean Cleanup aimed to “tackle” pollution in the world’s 1,000 most polluted rivers.

Professor McIlgorm said focusing its funding on its onshore projects would have a bigger impact at this stage than trying to clean up the Great Pacific Garbage Patch.

“I’ve done projects up in Jakarta, in Indonesia, holding workshops and trying to work out why the marine debris is there.

“The main problem was just a lack of a domestic bin system. People put plastic bags out, basically the dogs got them, the rain got them, the wind got them.

“The best estimate was that only about 50 per cent of domestic trash got to any form of organised dump. But then at the dump, it didn’t have good fences. So the wind was blowing it all over the place.

The Cocos (Keeling) Islands consist of two small coral atolls around 2,000 kilometres off the coast of northern Western Australia.

Despite a population of around 600 people, they’re drowning in trash from just a couple of Indonesian rivers.

120 Charitha Pattiaratchi, a multidisciplinary researcher from the University of Western Australia, said the plastic situation on Cocos (Keeling) Islands clearly demonstrated the importance of cutting off waste at the source. "The Cocos Islands get 27 tonnes of plastics a year [washing up]," Professor Pattiaratchi said. "Now we've found out that three rivers in Indonesia provide 80 per cent of the plastics to the Cocos." He said better infrastructure along with education were the best preventative measures for stopping plastics entering the oceans.

125 "The ideal place is stopping it at the land. Failing that, then target the rivers. "[Oceanic] garbage patches are the end of the pathway." But once the plastic was in the middle of the ocean, the method used by The Ocean Cleanup was about the best we've got, Professor Pattiaratchi said.

130 "That's about the only way you can do it, unfortunately."

The Ocean Cleanup's self-defined benchmark of success is whether it can reduce ocean plastic by 90 per cent by 2040. Whether its efforts in the Pacific can ever fulfil its promise remains to be seen.

135 Given its track record of adapting to "unscheduled learning opportunities", it may be that it turns its focus more to onshore solutions like interceptors in future. But given the massive and growing problem that plastic pollution is, Professor Reichelt-Brushett said, at this stage, anything was better than nothing.

"I definitely think it's a piece of the puzzle," she said.

140 "I think everyone that invests time and effort is making a small difference."  
*(The Ocean Cleanup was contacted for this story, but did not respond by deadline.)*

#### **Document 4:**

#### **LISTENING**

#### **The Other Source: Where does plastic in the Great Pacific Garbage Patch really come from?**

The Ocean Cleanup

<https://youtu.be/CqnMjYImNyQ>

Watch this video and find out where ocean plastic comes from.



**SPEAKING - DEBATE:**

**Is it worth spending so much money on cleaning up our oceans?**

**Organisation:**

The chairperson will introduce the debate by explaining what garbage patches are and the problems they raise. One team will focus on why it is a waste of time and money (and can propose other solutions instead) to try and clean up these patches. One team will defend projects such as the Ocean Cleanup initiative and explain why we should support them.

**Prepare for the debate**

Use the documents in the handout to find precise, accurate information, in order to be able to use facts and figures to defend your point of view.

Use the following grid to note down arguments you find interesting.

For	Against

## Air pollution

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*Find more information and vocabulary related to this subject on eCampus*

### LISTENING –

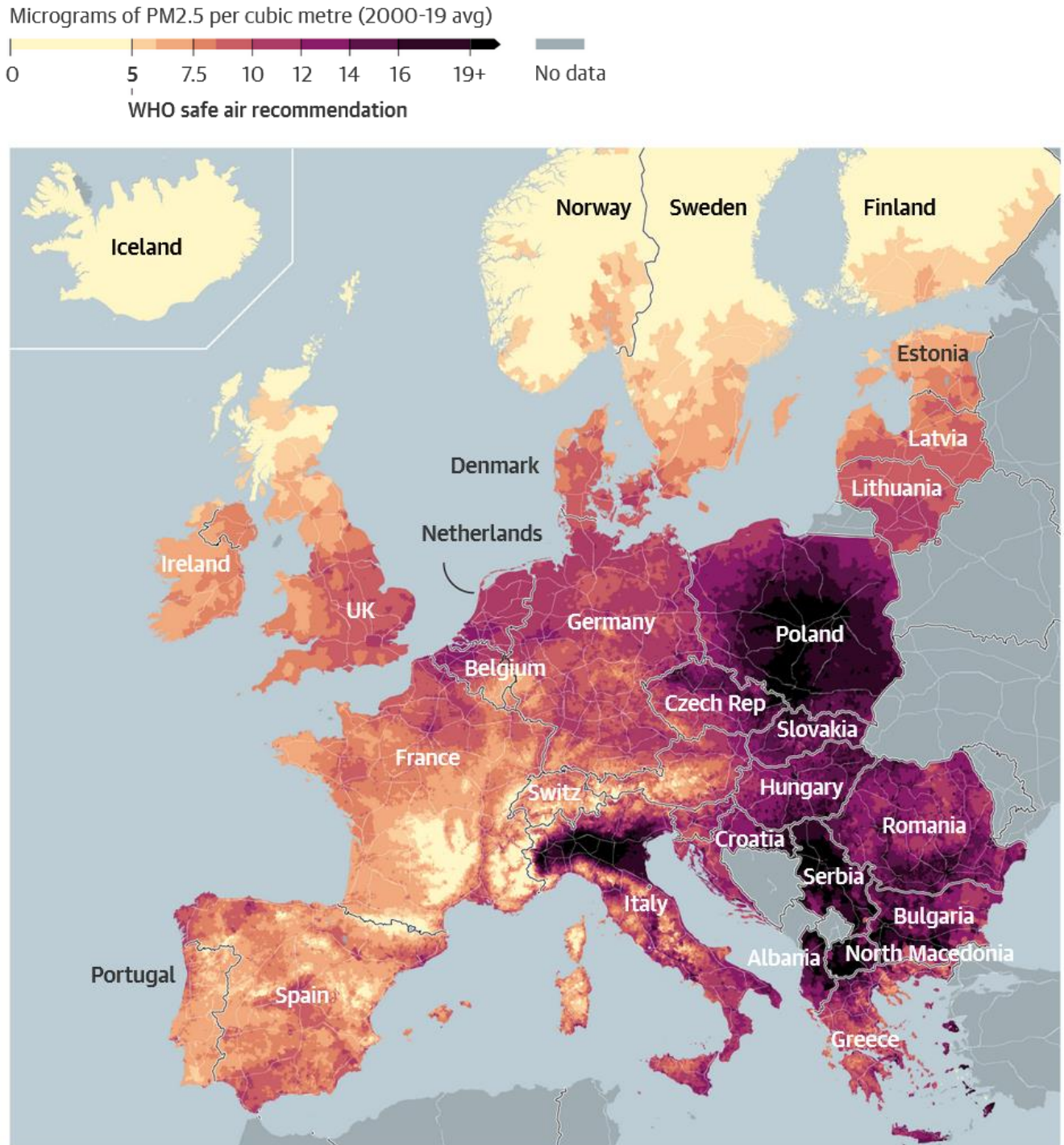
Global comprehension    Detailed comprehension

Natural sources of air pollution	
1. 2. 3.	
Man-made air pollution	
Example 1 Example 2	
Different types of man-made air pollution	
1. .... a) ..... b) ..... c) .....	
2. .... a) ..... c) .....	
3. .... a) .....  b) .....	
Solutions	

## READING 1 - Almost everyone in Europe is breathing toxic air

**Guardian investigation finds 98% of Europeans breathing highly damaging polluted air linked to 400,000 deaths a year**

The Guardian - Matthew Taylor and Pamela Duncan - 24 Nov 2023



For more specific information, check this interactive map :

**Europe's pollution divide: see how your area compares:** <https://www.theguardian.com/environment/ng-interactive/2023/sep/20/europes-pollution-divide-see-how-your-area-compares>

Europe is facing a “severe public health crisis”, with almost everyone across the continent living in areas with dangerous levels of air pollution, an investigation by the Guardian has found.

5 Analysis of data gathered using cutting-edge methodology – including detailed satellite images and measurements from more than 1,400 ground monitoring stations – reveals a dire picture of dirty air, with 98% of people living in areas with highly damaging fine particulate pollution that exceed

World Health Organization guidelines. Almost two-thirds live in areas where air quality is more than double the WHO's guidelines.

The worst hit country in Europe is North

15 Macedonia. Almost two-thirds of people across the country live in areas with more than four times the WHO guidelines for PM2.5, while four areas were found to have air pollution almost six times the figure, including in its capital, Skopje.

20 Eastern Europe is significantly worse than western Europe, apart from Italy, where more than a third of those living in the Po valley and surrounding areas in the north of the country breathe air that is four times the WHO figure for the most dangerous  
25 airborne particulates.

The Guardian worked with pollution experts to produce an interactive map revealing the worst-hit areas on the continent. The measurements refer to PM2.5 – tiny airborne particles mostly produced  
30 from the burning of fossil fuels, some of which can pass through the lungs and into the blood stream, affecting almost every organ in the body. The current WHO guidelines state that annual average concentrations of PM2.5 should not exceed 5  
35 micrograms a cubic metre ( $\mu\text{g}/\text{m}^3$ ). The new analysis found only 2% of the population of Europe live in areas within this limit. Experts say PM2.5 pollution causes about 400,000 deaths a year across the continent.

40 "This is a severe public health crisis," said Roel Vermeulen, a professor of environmental epidemiology at Utrecht University who led the team of researchers across the continent that compiled the data. "What we see quite clearly is  
45 that nearly everyone in Europe is breathing unhealthy air."

The data also reveals:

- Almost all residents in seven countries in eastern Europe – Serbia, Romania, Albania, North  
50 Macedonia, Poland, Slovakia and Hungary – have double the WHO guidance.
- More than half the population of North Macedonia and Serbia live with four times the WHO figure.
- In Germany, three-quarters of the population  
55 lives with more than twice the WHO guidance. In Spain that figure is 49%, and in France it is 37%.
- In the UK, three-quarters of the population live in areas where exposure is between one and two times the WHO guidance, with almost a quarter  
60 more than two times over that limit.
- Close to 30 million Europeans are living in areas with small particle concentrations that are at least four times the WHO guidelines.

• In Sweden, by contrast, there is no area where  
65 PM2.5 reaches more than twice the WHO figure, and some areas in northern Scotland are among the few across Europe that fall below it.

Traffic, industry, domestic heating and agriculture are the main sources of PM2.5 and the impact is  
70 often felt disproportionately by the poorest communities.

Air pollution has become a key issue in Europe, with the EU coming under pressure to do more to tackle the growing public health crisis. Last week,  
75 the European parliament voted to adopt the WHO guidelines on PM2.5 by 2035. The law, which must still be finalised in negotiations with the council, would set a legally binding limit for annual PM2.5 concentrations of  $5\mu\text{g}/\text{m}^3$ , down from  $25\mu\text{g}/\text{m}^3$   
80 today.

But experts say urgent action needs taking now. They point to a growing body of evidence that shows air pollution affects almost every organ in the body and is linked to a huge range of health  
85 problems from heart and lung disease to cancer and diabetes, depression and mental illness to cognitive impairment and low birth weight.

One recent study found air pollution was responsible for 1 million stillbirths a year, another  
90 that young people living in cities already have billions of toxic air pollution particles in their hearts.

Dr Hanna Boogaard, an expert on air pollution in Europe at the US Health Effects Institute, said the  
95 new analysis was crucial to help inform the debate about air pollution and its effects in the continent, which she said resulted in hundreds of thousands of deaths each year.

"These deaths are preventable and the estimate  
100 does not include millions of cases of non-fatal diseases, years lived with disability, attributable hospitalisations, or health effects from other pollutants."

She said the move to toughen up the EU's limit  
105 provided "a unique opportunity to be bold ... and maximise public health benefits for Europe and beyond."

Some towns and cities across Europe, including London and Milan, are making strides to tackle air  
110 pollution, from the introduction of ultra-low emissions zones to traffic reduction schemes and walking and cycling initiatives. But experts say politicians must act with more urgency in light of the growing evidence of harm.

115 Research has also shown that within countries, poorer communities are more likely to live in areas with the worst air pollution. Barbara Hoffmann, professor of environmental epidemiology at the

University of Düsseldorf, said air pollution was an  
120 issue of “environmental injustice”.

“The countries that are hit most are also the  
countries with the lowest mean income, with a few  
notable exceptions – this illustrates the degree of  
environmental injustice we are experiencing in the  
125 EU. Cleaning up the air specifically in eastern  
Europe is urgently needed to provide equal  
opportunities for a healthy life across Europe.”

The data was compiled by academics at Utrecht  
University in the Netherlands and the Swiss  
130 Tropical and Public Health Institute as part of the  
EU-funded Expanse project. They used a  
combination of sources, from high-resolution  
satellite data to pollution monitoring stations and

information about land use, to model annual  
135 average PM2.5 levels across Europe in 2019.

They say pollution levels will not be significantly  
different today, but added there may be areas  
where stringent anti-pollution measures have been  
implemented that have seen some improvement.  
140 The overall result is one of the most accurate and  
comprehensive pictures of air pollution across the  
continent to date.

Vermeulen said: “This is the best data that there is  
available at the moment ... Now we need politicians  
145 to be bold and ambitious and take the necessary  
urgent steps to tackle this crisis.”

## READING – 2

The 6 subtitles have been removed from the article and jumbled up. Put them back in the right space.

- A Agriculture
- B What can I do?
- C Industry and power generation
- D Shipping
- E Home heating
- F Traffic

### *What can be done to combat air pollution in Europe?*

*From wood burning to driving, there are things people can do – but industries such as shipping and agriculture bear most of the responsibility*

The Guardian - Gary Fuller - 21 Sep 2023

While air pollution is largely invisible to us in our  
daily lives, the health impacts of breathing tiny PM2.5  
particles is increasingly well known. So what can we  
do about it?

5 A study from the Barcelona research institute  
ISGlobal connects health impacts to their sources in  
more than 800 cities across Europe, and identifies  
priorities for action. Some sources are obvious, but  
many have been overlooked for years.  
10 For Europe as a whole, the main source of air  
pollution is home heating. This is followed by  
agriculture, industry, transport and shipping, but  
priorities vary from place to place. For north-west  
Europe, agriculture is dominant. Transport pollution  
15 is the biggest source in the cities of central and north-  
west Europe, along with northern Italy. Farther east,  
home heating, energy generation and agriculture are  
priorities for action.

Here, we explore each of the five sources, which need  
20 structural solutions, as well as what you as an  
individual can do.

1. \_\_\_\_\_

Burning solid fuel is the most polluting way to heat  
homes. The health cost of air pollution from home

25 heating across Europe is estimated at €29bn a year in  
2018.

The availability of fossil gas from the 1970s meant  
that many homes in western Europe turned away  
from solid fuel heating, leading to large  
30 improvements in air quality. For the last two decades,  
this trend is being reversed with the rising popularity  
of wood stoves as an aesthetic and second source of  
heating.

In eastern Europe, home heating with coal remains  
35 popular. In Italy, the impacts come mainly from wood  
burning. Studies across Ireland highlight severe  
particle pollution from wood, coal and peat burning  
in both small rural towns as well as big cities.

Dr Jurgita Ovadnevaite, from the University of  
40 Galway, said: “Solid fuel burning results in extreme  
air pollution events, spanning most populated areas  
in Ireland, with levels frequently exceeding the World  
Health Organization recommendations for health. The  
obvious solution would be to ban solid fuel burning  
45 completely. To make this feasible, houses should be  
properly insulated for electricity to become a viable  
alternative.”

2. \_\_\_\_\_

The main source of PM2.5 from agriculture is ammonia emitted from fertiliser and animal waste. This pollutes our rivers as well as our air.

Dr Anna Font of the research institute IMT Nord Europe said: "Agriculture represents about 94% of all ammonia emissions in Europe. Ammonia emitted as a gas will rapidly transform into ammonium particles by combining with sulphate and nitrate. These represent roughly 20% to 40% of total PM2.5 in the air."

"From satellite data we can see hotspots of ammonia in north-western Europe (including the Netherlands, Belgium, and north-west Germany), Brittany, the Po Valley in northern Italy and the Ebro valley in north-east Spain."

If farmers reduced ammonia emissions they would need to buy less fertiliser to put nitrogen into their soils.

Prof Mark Sutton, from the UK Centre for Ecology and Hydrology, explained: "Most ammonia emissions come from livestock excreta and fertilisers."

"With high fertiliser prices in 2022, total UK nitrogen losses were worth around £3bn. This is around the same as the total UK agricultural subsidy. Covering manure stores and incorporating manure and fertiliser in the soil can reduce these emissions by 90%. Reducing ammonia emissions avoids this massive waste of resources and is good for air quality at the same time."

3. \_\_\_\_\_

In the 1970s, forest die-back from acid rain was a powerful visual image of the impacts of air pollution. Today, large industries across the developed world are subject to inspection and control but they still add to our air pollution.

Examples of sudden health improvements following the closure of polluting industrial sites demonstrate the burden that industry can still create, and therefore the opportunities for better technological solutions.

In 2016, the closure of a coal processing plant near Pittsburgh, US, was followed by an immediate 42% decrease in emergency room visits for heart problems in the local community, and further improvements in the years that followed.

Prof George Thurston, of New York University Grossman School of Medicine, who studied the impacts of the coal processing plant, said: "We need to focus our clean air efforts on eliminating the most health damaging particles – those emitted by fossil fuel combustion and industrial processes."

Documented health effects include increased cardiovascular deaths, hospital admissions and

emergency room visits, as well as an increased risk of asthma attacks among children."

4. \_\_\_\_\_

Vehicles bought in Europe today contain engine management systems, filters and catalysts to clean their exhausts but all vehicles, even electric ones, still produce particle pollution from the wear of brakes, tyres and road surfaces. These are not subject to regulation and there are no mass-market engineering solutions.

Dr Will Hicks, of Imperial College London, said: "Drivers can help by driving smoothly. This could be encouraged through traffic calming measures (30kph speed limits should help), media campaigns and driver awareness courses."

Long-term solutions lie in the design of our towns and cities.

Prof Mark Nieuwenhuijsen, of the Barcelona research institute ISGlobal, said: "Too often we focus on technological solutions. Land use and behavioural changes such as the Barcelona Superblocks, Paris's 15-minute city or London's low-traffic neighbourhoods also reduce air pollution and bring additional benefits such as increased walking and cycling, which is good for health."

5. \_\_\_\_\_

The seas around Europe are home to some of the world's busiest shipping lanes. New rules have led to better quality marine fuel and the use of scrubbing systems, but shipping remains a major source of particle pollution. In the UK, breathing PM2.5 from shipping is estimated to result in a health cost of about £1.5bn at 2017 prices. The air pollution from shipping reaches hundreds of kilometres inland but it is especially intense in coastal areas and ports.

Dr Matthew Loxham, of the University of Southampton, said: "Where shoreside power is not used, ships tend to keep auxiliary engines running to satisfy their power. The largest cruise ships require more than 10MW of power at berth\* (5,000-10,000 times greater than average household requirements), and therefore it is unsurprising that there is some impact on local air quality."

Loxham added: "In the future we may see a move towards alternative fuels, such as liquefied natural gas, hydrogen, methanol and ammonia, or ships being powered by battery (electric) or nuclear energy. Each of these comes with environmental, health, life-cycle, and safety considerations of their own."

6. \_\_\_\_\_

There are clearly actions that we can take in our everyday lives to reduce particle pollution. Not heating our homes with solid fuels, if we have that

155 option, is an obvious one. Not driving is another but sometimes our city design leaves us with few other choices.

We can reduce our exposure. Studies in London have shown that walking down a back road instead of a main street can reduce your exposure to PM2.5 from traffic exhaust by more than 30%.

However, it is widely recognised in the climate debate that focusing on individual actions can divert responsibility from the sectors that are really responsible for the problem. Similarly, tweaks to everyday life will not improve particle pollution from farming, shipping and industry, for example. These require action by governments and industries.

Source : <https://www.theguardian.com/environment/2023/sep/21/what-can-be-done-to-combat-air-pollution-in-europe>

Consider the six issues

	Information about the problems (What? Where? Why ? How ?)	Possible solutions
Agriculture		
What can I do?		
Industry and power generation		
Shipping		
Home heating		
Traffic		

Your turn: What actions should industries and governments take to tackle air pollution?

**LISTENING – What about the situation in the US? Listen to this podcast:**  
<https://podcasts.apple.com/us/podcast/why-air-quality-is-getting-worse-in-many-places-and/id1303658979?i=1000651642029>

## PHONOLOGY: Word stress – Two-syllable words

There are many two-syllable words in English. They can obviously be stressed on the first or the second syllable, but there are a few rules to help you.

A. Stress on first syllable	
• Most 2-syllable <b>nouns</b>	<b>PRE</b> sent – <b>EX</b> port – <b>CH</b> ina – <b>TA</b> ble –
• Most 2-syllable <b>adjectives</b>	<b>PRE</b> sent – <b>SL</b> ender – <b>CLE</b> ver – <b>HAP</b> py
B. Stress on last syllable	
Most 2-syllable <b>verbs</b>	pre <b>SEN</b> T – ex <b>PORT</b> – – de <b>CIDE</b> – be <b>GIN</b>

/!\ The word **present** is a two-syllable word. If we stress the first syllable, it is a noun (gift) or an adjective (opposite of absent). But if we stress the second syllable, it becomes a verb (to offer).

There are many two-syllable words in English whose meaning and class change with a change in stress. The only way to know them is to learn them!

More examples: **rebel**, **record**, **import**, **contract** and **object** can all be nouns or verbs, depending on whether the stress is on the first or second syllable.

**PRACTICE:** circle the stressed syllable. Make sure the words proposed are not exceptions! (Check in the vocabulary list, or a dictionary, if necessary.)

carbon – to release – to emit – acid – traffic – exhaust – to damage – to commute – asthma –  
to limit – to control – to exceed – public – to pollute

## WRITING / SPEAKING:

Write a **speech** to convince your city council to tackle the problem of air pollution in your city. Define the problem and propose solutions.

Prepare your presentation: work on pronunciation, word stress and intonation.

Give your speech to the class, and vote for the most convincing one.



*Find more information and vocabulary on this subject on eCampus*

## LISTENING – Invasive species

<https://youtu.be/JMCasi2vBy0>

**I. Introduction :** Complete the sentence with the appropriate words:

Rapidly ....., ....., they conquer, ..... local economies ..... human health and ..... entire eco systems

## II. Definition of invasive species

.....  
.....

- 2 consequences of their introduction: 1. ....  
2. ....

## III. Explanation of the presence of invasive species:

**A** .....  
.....

- ⇒ example of an invasive species: .....  
○ where is it from?  
○ where is it now?

**B** .....  
.....

- ⇒ 1st example of an invasive species (animal): .....  
a. where is it from?  
b. where is it now?  
c. when was it introduced?  
d. consequences nowadays:

Invasive species can be: 1. animals 2.....  
3. .... 4.....

- ⇒ 2nd example of an invasive species: .....  
e. where is it from?  
f. where is it now?  
g. when was it introduced?  
h. consequences nowadays:  
i.

Invasive species have an impact on 1. ....  
2. ....  
3. ....

Cost: .....

## IV. How to help

How can you limit the spread of invasive species?

.....  
.....  
.....

**READING – The 6 subtitles have been removed from the article and jumbled up. Put them back in the right space.**

- a. Why has all this happened?
- b. What has the report found?
- c. Should we not have realised this sooner?
- d. What do we do now?
- e. What is the UN's global assessment report and why is it important?
- f. Why does this matter?

## **Biodiversity: what the UN has found and what it means for humanity**

*The Guardian* - Fiona Harvey - 6 May 2019

### **The global assessment report paints a dire picture of our effect on the natural world**

#### **1.....**

That humans are meddling with the natural world, in ways that we often fail to understand, is no longer in doubt. From the near-extinction of many land animals – the elephant, the tiger, the rhinoceros – in their natural habitats to the destruction of forests in the developing world, the decline of insect life in areas of intensive agriculture in developed countries, and more recently the increasingly evident scourge of plastics in the oceans, our imprint on the natural world has become impossible to ignore.

There is scarcely any natural environment, from the Amazon to Australia, where the hazards we have introduced are unseen – take microplastics, now known to be almost ubiquitous, or the dark stains of soot we have left upon the Arctic snowcap, in places where humans have never trodden but our footprints are clearly visible. Beyond these obvious effects, we are also wreaking changes on the climate which scientists warn will have dire consequences.

Until now there has been no comprehensive attempt to look at all of these effects, even though some of them have been long known. The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) was convened by the United Nations to find an answer to the questions: what are we doing to the world's species, its biodiversity, its ecosystems and its natural resources? And what are the consequences – for human life, as well as the natural world?

#### **2.....**

At least a million species are at risk of extinction because of human actions. The abundance of native species in most major land habitats has fallen by a fifth since 1900. Frogs and other amphibians, particularly vulnerable because of their bodies and breeding habits, have suffered an astonishing 40% decline. Many scientists see amphibians as the “canary in the mine”, signalling dangers such as pollution and the spread of disease that can hit frogs and other amphibians harder at first than they do other animals.

Nearly a third of corals around the world and more than a third of marine mammals are also threatened. At least 680 vertebrate species have been driven to extinction in the last 400 years, and that is of those that can be reliably counted.

Even among the animals we value commercially, the picture is grim: about a tenth of all the domesticated breeds of mammals that we eat have been driven to extinction, as we increasingly focus on just a few breeds.

#### **3.....**

We do not know what the long-term consequences of our destruction will be for the rest of the Earth. We do know that the changes we are wreaking are already leaving us vulnerable. In the case of domesticated plants and animals, for instance, the lack of biodiversity in genes is leaving us with less protection against diseases, and fewer options for breeding plants and animals that will be better adapted to our changing climate.

The decline in insect populations is another key example: where pollinators are not available, the cascading effects on ecosystems can quickly become catastrophic. Once these wild populations are eradicated or severely depleted, we have few ways to try to bring them back, and we cannot replace the “ecosystem services” – of pollinating plants that we need for food – that they provide.

#### **4.....**

The signs of our despoliation of the natural world have been evident at least since the extinction of the dodo in 1681. Some of the earliest shouts of what turned into the modern environmental movement in the late 1960s and early 70s were to “save the whale” and other charismatic megafauna, such as the elephant and tiger.

Yet while there has been growing awareness of the dangers to these few species, we have managed to ignore the much wider devastation that has been going on. Few noticed the decline of the bumblebee until just a few years ago, and frogs have gone largely unlamented, despite playing a key role in ecosystems.

5.....

Increasing population has been a key factor, as it reduces the habitat available for animals and plants, but this would be less of a problem if it were well-managed – deforestation, for example, could be vastly reduced if we used existing resources better. Pollution of the air and water is also important, and the threats posed by some of the substances we have used for pest control have gone unremarked for years. In the oceans, overfishing and plastic pollution have played a big role. Climate change is likely to exacerbate these problems.

6.....

The IPBES recommends changes to agricultural practices as a hugely important step, and better coordination among countries and authorities to help them cut down on destructive practices. Increased awareness of the problem is also vital – as with climate change, which scientists have been reporting on in detail for 30 years, gaining information and understanding on the nature of the problem is at least a start towards solving it.

## READING:

# Driving out invasive species on islands has high success rate and big benefits – study

New research finds that eradicating non-native rats, cats, rabbits and goats is 88% effective in restoring biodiversity

5 Eradicating rats, goats and other invasive animals from islands is one of the most effective tools for protecting wildlife, resulting in dramatic transformations to degraded archipelagos and atolls, according to a new study.

10 From the dodo to Daudin's giant tortoise, island species have been disproportionately affected by extinctions, often caused by the arrival of alien species brought by colonisers that killed wildlife found nowhere else on Earth.

15 Now a new study has given hope that biodiversity loss on islands can be halted and, in some cases, reversed by removing invasive species such as rabbits, cats, goats, mice and rats from these ecosystems to allow native fauna to recover.

20 A review of 1,550 eradications on nearly 1,000 islands since 1872 found an 88% success rate using methods such as hunting, trapping and targeted poisoning to help restore the islands' biodiversity, according to a study published in Scientific Reports.

25 Once an invasive species has been removed from an island, the recovery of nature can be dramatic. In 2011, rats were eradicated from Palmyra Atoll in the mid-Pacific; the germination of native plant seedlings increased by more than 5,000%, two previously undocumented crab species became abundant, and coral began to recover.

On Redonda, a mile-long rock that is part of Antigua and Barbuda in the Caribbean, native vegetation, birds and reptiles burst back into life once invasive black rats and feral goats were

35 removed in 2017, transforming the barren grey rock into a green island once again.

The researchers said an ambitious target for removing invasive species from islands must be included in this decade's UN agreement for protecting the natural world, which will be agreed at Cop15 in Montreal, Canada, in December.

40 Although islands cover just 5% of the Earth's land area, places like the Galápagos, Madagascar and Borneo are disproportionately important havens for biodiversity, and are home to two in five of globally threatened vertebrates.

45 "This is one of the most effective conservation tools we have for protecting biodiversity," said Piero Genovesi, a co-author of the study and chair of the IUCN invasive species specialist group. "We need to multiply our efforts. So far, we have only addressed a limited number of islands."

50 The majority of eradications took place in just eight countries – New Zealand, Australia, the UK, the US, France, Mexico, Ecuador and Seychelles – and nearly always involved removal of invasive mammals, the study found. Most efforts have targeted rats, while goats, donkeys and cats were all common.

60 While the number of eradications has dipped in recent years, the size of islands targeted has increased, according to data stored on the Database of Island Invasive Species Eradications, which was used for the study's findings.

65 "Countries that have been restoring islands for decades were able to because of their investments in innovations and resources," said David Will, co-author and head of innovation at Island Conservation. "They are now looking to larger, more

- 70 challenging projects such as those with substantial human communities, and adding on restoration work like species translocation, which is made possible once the threat of invasive species is removed.”
- 75 In New Zealand, scientists are about to attempt the biggest ever eradication of invasive species on an inhabited island. The project aims to remove predators including possums, rats, feral cats and hedgehogs from Rakiura/Stewart Island over the
- 80 next four years.

- Invasive species are one of the five main drivers of biodiversity loss, according to the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, along with
- 85 land-use change, resource extraction, the climate crisis and pollution. A UN report about their global impact is expected in 2023.

Source : [The Guardian](#)

### PHONOLOGY: words ending in -tion / -sion

Words ending in -tion are stressed on the penultimate syllable (penultimate = second from end), which means the syllable before -tion is stressed:

Ex: a**TT**ENTION – defores**T**ATION – ex**PRE**SSION

The -tion and -sion suffixes are base suffixes for more related suffixes, namely -tional, -tionally, -sional, -sionally. The syllable stress pattern remains consistent, even when more syllables are added to the word: the syllable previous to the -tion or -sion carries the word's primary stress.

Ex: a**DD**ITION -> a**DD**ITIONAL / e**MO**TION -> e**MO**TIONALLY

### ➤ PRACTICE: circle the stressed syllable and practice your pronunciation

Extinction – conservation – preservation – reforestation – depletion – despoliation –  
disruption – acidification – destruction – proportionally – traditional –  
educational – exceptionally - intentional – rationally – professional -occasionally

### GRAMMAR FOCUS: *Present perfect or Past simple?*

See lesson on eCampus

- Today, our imprint on the natural world \_\_\_\_\_ (become) impossible to ignore.
- Until now, there \_\_\_\_\_ (be) no comprehensive attempt to look at all the effects even though some of them \_\_\_\_\_ (be) long known.
- The abundance of native species in most major land habitats \_\_\_\_\_ (fall) by a fifth since 1900.
- In 2011, rats \_\_\_\_\_ (be) eradicated from Palmyra Atoll in the mid-Pacific; the germination of native plant seedlings \_\_\_\_\_ (increase) by more than 5,000%, two previously undocumented crab species \_\_\_\_\_ (become) abundant, and coral \_\_\_\_\_ (begin) to recover.
- The survey shows that frogs and other amphibians \_\_\_\_\_ (suffer) an astonishing 40% decline from 10 years ago to today.
- But, on Redonda, in the Caribbean, native vegetation, birds and reptiles \_\_\_\_\_ (burst) back into life once invasive black rats and feral goats \_\_\_\_\_ (be) removed.
- At least 680 vertebrate species \_\_\_\_\_ (be driven) to extinction in the last 400 years
- The threats posed by some of the substances we \_\_\_\_\_ (use) for pest control \_\_\_\_\_ (go) unremarked for years.
- While the number of eradications \_\_\_\_\_ (dip) in recent years, the size of islands targeted \_\_\_\_\_ (increase).
- When colonisers \_\_\_\_\_ (settle) on new territories, they \_\_\_\_\_ (bring) alien species that \_\_\_\_\_ (kill) wildlife found nowhere else on Earth.

*Find more information and vocabulary on this subject on eCampus*

## READING -

### Why is everyone so angry about generating energy?

*BBC news - 25 November 2013 - By David Shukman (Science editor)*

Britain faces difficult choices about its future energy supplies yet every proposal meets strenuous, sometimes hostile, objections.

Propose a new wind farm for some beautiful  
5 uplands one morning and you can guarantee a protest group furious at the ruined views will have formed by the afternoon. Suggest that we extract gas by fracturing a layer of deep shale and you can be sure celebrities will be superglued to the drilling  
10 rig before you have finished speaking. Want to burn more coal because it's cheap? You'll have climate scientists warning of the consequences and direct action campaigners reaching for the climbing kit. And the merest hint that nuclear might be a good  
15 idea will trigger complaints about the cost and placards bearing images of Chernobyl and Fukushima.

Everyone is angry about energy. But why is the generating of electricity attracting such heat?

20 One answer is geography. Originally our mains power came from stations burning coal close to where the electricity was needed - in our cities. Then, as the National Grid spread its network of pylons across the country, the old Central Electricity  
25 Generating Board opted to stick the biggest plants close to the coal mines. Hence the giant power stations in Yorkshire, among others. Later, the government of Margaret Thatcher launched a "dash for gas" to capitalise on home-produced fuel from  
30 the North Sea and to weaken the stranglehold of the miners' unions. The result was that Britain built up a mix of electricity, from power stations burning coal and gas with nuclear plants providing the rest, mostly in coastal locations close to abundant water  
35 and far from conurbations.

But suddenly the business of making electricity and extracting fuel is barging into areas that have previously been spared it. Quiet fields everywhere  
40 from Lancashire to Sussex lie above potentially rich reserves of oil and gas. Hills made famous by Thomas Hardy and landscapes portrayed by Turner are ideally windy for massive turbines. No wonder the banners are out in force. So energy is threatening to become a feature of regions that are  
45 used to receiving it rather than making it, and that's throwing up some interesting challenges and contradictions.

The conservation director of the Yorkshire Dales National Park, Gary Smith, is convinced climate  
50 change is a serious threat and renewable power is an important part of the solution. He likes wind energy in principle and admits windswept uplands like the Dales would - in a purely technical sense - be ideal for rows of turbines. But he's steadfastly  
55 opposed to them.

"As a society we need more energy," he tells me as a stiff breeze buffets us near the beauty spot of Malham Cove, "and climate change feels like it's happening but that doesn't merit putting up  
60 massive wind farms here and ruining some of the country's biggest treasures. Commercial developers would think this is a cracking place for a wind farm but the price would be too high - there are plenty of other places where you can put them."

65 So if wind turbines are regarded as scenery wreckers, what about the more traditional route of a fuel that powered the Industrial Revolution?

Coal provides about 40% of the country's electricity, a remarkably high proportion given the  
70 government's commitment to be the greenest ever. At the moment coal is cheap, partly because it is plentiful and partly because US power stations are switching to much cheaper shale gas. The downside is that it gives off more carbon dioxide than any  
75 other form of fuel, so burning too much of it would make it impossible for Britain to meet its targets for cutting emissions.

At Drax in North Yorkshire, the vast towers of the country's biggest power generator - and biggest  
80 carbon emitter - loom over the flat landscape but they are no longer alone: flanking them is a new line of wind turbines.

Phil Garner, spokesman for CoalPro, the UK coal producers, says: "Wind has its place - I'm not  
85 against it. But in the last 12 months this wind farm produced less than 1% of the electricity generated by Drax. Drax is chucking out a load of carbon dioxide but equally it's also producing a lot of affordable electricity and, if it wasn't there, the  
90 electricity would be from far more expensive forms." His solution is to keep open coal stations currently slated to close and to build new more efficient ones that could eventually trap the carbon

dioxide, though he accepts that technology is a long  
95 way off.

So if coal is cheap but too polluting and wind is  
seen as an intermittent eyesore, what about the  
nuclear option?

It is low-carbon but also relatively expensive and  
100 strenuously opposed by environmental groups.  
Behind a carefully guarded security fence at Harwell  
in Oxfordshire stands all that is left of Britain's days  
in the 1950s as a pioneer of nuclear power. A heavy  
steel door leads into one of the old reactor  
105 buildings. The nuclear fuel has long since gone and a  
Geiger counter registers no radiation.

Green activist Mark Lynas says: "If you want to  
deal with climate change, then you have to generate  
large amounts of zero-carbon power and while I  
110 want a massive expansion of renewables, they can't  
provide what you need when there's no wind and at  
night." He was opposed to nuclear power for years  
but was then suddenly converted. Mr Lynas says:  
"People are against everything these days - the only  
115 acceptable form of energy is magic. People are

Source: [BBC.com](https://www.bbc.com)

### **LISTENING 1 - What are fossil fuels?**

[https://youtu.be/ss\\_T7NW5X9M](https://youtu.be/ss_T7NW5X9M)

Watch the video and note down the most important information.

'Nimby-istic', if that's a word, but if I had to have  
power generation close to me I'd prefer nuclear to  
coal or gas."

Gas is one of the government's great hopes, not  
120 so much imported as produced by fracturing shale  
rock here in this country. But fracking has produced  
yet another wave of opposition, and in Downing  
Street I met protesters who had travelled to deliver  
a petition to the prime minister. Kathryn  
125 McWhirter, who helped set up an anti-fracking  
group in Balcombe in Sussex, says she would prefer  
wind turbines around her village. But Andrew  
Pemberton, a farmer from Lancashire worried  
about drilling pollution affecting his herd's milk, is  
130 not keen on wind, and he is not happy about nuclear  
or coal.

But to keep the lights on and a lid on energy bills  
and at the same time do something about carbon  
emissions, the country is going to need some very  
135 big energy projects - and very soon. They have to go  
somewhere and, whichever type of power you  
choose, it is going to make someone angry.

### **LISTENING 2 - Renewable energy?**

[https://www.youtube.com/watch?v=lkjQHQzbuy0&feature=emb\\_logo](https://www.youtube.com/watch?v=lkjQHQzbuy0&feature=emb_logo)

Watch the video and take notes on the most important information.

# The hydrogen revolution

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## LISTENING

Watch the video and find out how hydrogen fuel cells work.

<https://youtu.be/9zgx-PIDEKA>

Draw a fuel cell and practice explaining how it works, using your own schematic.

The truth about hydrogen

<https://www.youtube.com/watch?v=AGTjKJHu99c>

## READING 1

### Is the hydrogen tech 'revolution' hope or hype?

By Roger Harrabin, BBC environment analyst - 1 July 2020

***In his speech on the planned economic recovery, the prime minister said hydrogen technology is an area where the UK leads the world. He hopes it'll create clean jobs in the future. But is the hydrogen revolution hope or hype?***

The digger with the long-toothed bucket bites into a pile of stones, tilts up and flexes its sturdy mechanical arm.

5 It swivels, extends the arm and dumps its load on the harsh ground of a Staffordshire quarry.

It's a beast of a machine and from the front it looks like a normal excavator.

10 But from the back you can see its tank full of dirty diesel has been replaced with a hydrogen fuel cell.

The excavator is the latest in a generation of vehicles powered by the lightest element on Earth.

15 The compendium of vehicles powered by hydrogen now stretches from diggers to micro-taxis, trucks, boats, vans, single-deck and now double-decker buses – and even small planes.

It works by reacting hydrogen with oxygen in a fuel cell to generate electricity. The only direct emission is water.

#### 20 **Talking about a revolution**

So at last, the long-awaited hydrogen revolution is here. Or is it?

Back in the early 2000s, backers of hydrogen thought it would dominate the clean automobile market.

But the promised "hydrogen highway" never materialised, for a couple of crucial reasons.

30 Firstly, hydrogen power needed a new infrastructure, whereas rival battery cars could be charged off the near-ubiquitous electricity grid.

Secondly, high-powered batteries at that time were already well-advanced for other uses such as computers, but hydrogen was not.

35 So hydrogen lost the head-on battle for the motor car. But now it's back in the frame for the sort of transport, industry and heating tasks that batteries are struggling to fulfil.

Take our large mechanical digger, a prototype from JCB. It has a little battery-powered cousin – 40 small enough to squeeze through a doorway and work in a building.

But JCB say the big digger would need a battery weighing five tonnes, and take hours to refuel.



Hydrogen on the other hand, is lighter than air and  
45 takes minutes to fill a tank.

Lorries fall into the same category as diggers –  
sometimes the battery would be as heavy as the  
payload.

### Double deckers

50 The same applies to buses, and the Bamford  
family, which owns JCB, says it has orders for 80  
double-deck buses from its Wrightbus factory at  
Ballymena in Northern Ireland.

That still leaves the issue of charging  
55 infrastructure – but that can be solved by providing  
hydrogen pumps on motorways for long-distance  
trucks.

The same network could fuel hybrid battery and  
hydrogen cars of the future and dispense with the  
60 need for ever-heavier batteries in plug-in cars.

Buses could use hydrogen stored at depots in  
Kevlar-lined tanks for safety.

Past fears of hydrogen tanks exploding have  
been addressed by the advent of tanks lined with  
65 Kevlar and hydrogen release mechanisms in case  
the tank is struck.

### Taking off

Airports could also store hydrogen, and the first  
test flight of an electric plane in the UK at Cranfield  
70 University recently was powered by a hydrogen fuel  
cell.

There is – forgive the pun – a head of steam  
building over hydrogen. Germany is racing ahead  
with a network of filling stations and a hydrogen  
75 train. It's investing €7bn in a bid to dominate the  
hydrogen market.

The EU Commission wants a slice of the action,  
too.

The website Euractiv reported that it plans to  
80 publish a hydrogen strategy soon. A leaked draft  
floated the idea of making the Euro the currency for  
international hydrogen trades, as the US Dollar is  
for oil.

The UK government also intends to announce a  
85 hydrogen strategy before the Parliament closes for  
the summer, as part of its economic recovery  
package.

It's being spurred on by rebukes that the UK lost  
the battle for battery technology to China – so it

90 mustn't let the hydrogen bandwagon escape. The  
government is advised by its Committee on Climate  
Change to start large-scale trials in the early 2020s.

Indeed, within weeks from now, Britain's first  
hydrogen train – developed by Birmingham  
95 University - will be tested on regular tracks.

So it looks as though hydrogen has finally made  
it. But not so fast... because it's by no means  
trouble-free.

Currently almost all the hydrogen sold in the UK  
100 is produced by splitting it from natural gas. But  
that's costly and emits lots of planet-heating carbon  
dioxide.

The problem can be tackled by capturing the  
CO2 at a hydrogen production hub, then burying it  
105 with carbon capture and storage. But that will drive  
the cost up further.

The alternative is inherently clean – but very  
expensive. It entails using surplus renewable  
electricity, like when the wind blows at night, to  
110 split hydrogen from water using a fuel cell.

### Fool cells?

The process is wasteful because it involves  
turning electricity into a gas, then back into  
electricity – a two-step shuffle dismissed by Tesla  
115 car chief Elon Musk as “staggeringly dumb”. “Fool  
cells”, he calls them.

But hydrogen-lovers believe the future  
electricity grid will produce so much cheap off-peak  
power that we'll need to find other uses for it. And  
120 they hope to see the cost of fuel cells plummet  
following the example of offshore wind.

Certainly, recent events have favoured the  
advance of hydrogen. When the UK had a target of  
80% carbon cuts by 2050, that left leeway for  
125 polluting forms of fuel to take up the remaining  
20% of the carbon “budget”.

Now it's widely accepted that homes with low-  
carbon heating systems such as heat exchangers  
will need a boost in a cold snap from another source  
130 – and that's looking increasingly like hydrogen.

Trials are already underway using hydrogen  
blended into natural gas at Keele University.

And, depending on how much support it gets  
from the government - it looks as though a  
135 technology that lost its key battle against battery  
cars two decades ago will still find a place in the  
zero-carbon economy of tomorrow

Source: <https://www.bbc.com/news/science-environment-53238512>



## READING 2

### A hydrogen fuel revolution is coming – here's why we might not want it

*Hydrogen is widely touted as a green fuel for everything from cars and planes to heating homes. But all too often it has a dirty secret*

*New Scientist* - 3 February 2021 - By Adam Vaughan

If hydrogen fuel is the future, it has been for quite some time. In his 1875 novel *The Mysterious Island*, Jules Verne imagined the element replacing coal as a fuel, split out of water to “furnish an  
5 inexhaustible source of heat and light”. Similar noises were made in the 1970s oil crisis, when hydrogen was touted as an alternative fuel for cars. And then there was US president George W. Bush in 2003, latching on to a new enthusiasm for hydrogen  
10 vehicles during the first wave of real concern about climate change. “We can make a fundamental difference for the future of our children,” he said.

Now hydrogen is back – again. From the US to Australia, and the European Union to China, the past  
15 year has seen an almost daily torrent of multibillion-dollar government funding pledges, tests of new technologies from trains and planes to domestic boilers, industry statements and analyses, and championing by leaders such as UK prime  
20 minister Boris Johnson. “We’re finding it hard to keep up with,” says Simon Bennett at the International Energy Agency.

“The idea of a hydrogen economy is not new,” says Martin Tengler at analysts Bloomberg New  
25 Energy Finance. “Now we’re in another hype cycle. The question is: is it different, or not?”

Tengler is one of many who thinks it is. Meanwhile, another question hangs much heavier than hydrogen in the air: is it really a clean, green  
30 fuel to help combat climate change? Or does the significant lobbying of fossil-fuel interests for a hydrogen economy indicate other priorities?

Hydrogen is the lightest element in the universe and the most abundant. On paper, it has a lot going  
35 for it as a fuel. Although it rarely exists on its own on Earth, it can be produced using clean electricity to split essentially inexhaustible water, producing only oxygen as a by-product.

**“Is hydrogen a clean, green fuel – or does  
40 fossil-fuel lobbying suggest a different story?”**

Once made, hydrogen acts as a chemical energy carrier, rather like oil or gas, that can be piped or transported to where it is needed. It stores three  
45 times as much energy per unit of mass as conventional petrol, and when it “burns” in air – releasing that stored energy – it simply combines with oxygen to produce water again. In that sense, it is the ultimate green fuel.

Perhaps the most notorious attempt to use  
50 hydrogen to change the world ended with the fiery demise of the German airship *Hindenburg* in New Jersey in 1937, when the hydrogen gas used to give it buoyancy caught fire. Technology for the safe storage of hydrogen has since come on in leaps and  
55 bounds. In recent decades, the idea of creating a “hydrogen economy” has focused on developing liquid hydrogen as an alternative green fuel, mainly for cars.

One thing that is different now is how hydrogen  
60 is being touted as a way to decarbonise “hard-to-abate” sectors that are difficult to power directly with clean electricity. These range from long-distance road haulage, aviation and shipping to naturally carbon-intensive industrial processes  
65 such as steel and petrochemical production (see “Six uses for hydrogen”).

#### **Green, grey or blue?**

The past two years of climate pledges by businesses and governments, from the UK to China,  
70 has made clear that even these industries will have to transform if we are to meet the overarching goal of net-zero carbon emissions by mid-century. And hydrogen figures big in that goal: the European Commission’s Joint Research Centre says that  
75 between 10 and 23 per cent of the EU’s final energy consumption could be covered by hydrogen in 2050; the energy company Shell puts the figure at 10 per cent globally by 2100.

Meanwhile, the rapidly falling costs of power  
80 from wind and solar farms has made the large-scale, clean production of hydrogen using clean electricity plausible. The problem is that the vast bulk of hydrogen isn’t currently made that way.

Humanity already produces around 70 million  
85 tonnes of hydrogen each year, mainly for use in making ammonia fertiliser and chemicals such as methanol, and to remove impurities during oil refining. Some 96 per cent of this hydrogen is itself made directly from fossil fuels – mostly natural gas,  
90 followed by coal and then oil. This overwhelmingly uses a process known as steam reformation that releases carbon dioxide.

Only 4 per cent of hydrogen is made in the way Jules Verne envisaged, using electrolysis to split it  
95 out of water. Much of the electricity to supply even that measly share of the hydrogen market comes

not from green sources, but from fossil fuel power plants. Far from being green, the hydrogen produced globally today has a carbon footprint on a par with the UK and Indonesia combined, says Tengler – about 830 million tonnes of CO<sub>2</sub> annually.

That brings us to the strange point where transparent hydrogen gets colourful, at least linguistically. “Grey” hydrogen is so-called because it is made from fossil fuels using steam reformation. It costs about \$1 a kilogram. “Blue” hydrogen typically “buries” the emissions associated with producing it using carbon capture and storage (CCS) technology – an approach which exists, albeit only on a pilot scale so far – for about \$2 per kilogram at the cheapest. Finally, there is “green” hydrogen, produced by electrolyzers running off renewable electricity. For the most part, this costs upwards of \$4 a kilogram.

When it comes to decarbonisation, “there’s no point in grey hydrogen”, says Rob Gibson at National Grid ESO, which runs the UK’s electricity transmission network. But a move towards large-scale green hydrogen production would be very costly, says Evangelos Gazis at Aurora Energy Research in Oxford, UK. This is where blue hydrogen comes in. “If we want to reach scale, probably [blue] will be inevitable,” says Gazis. Others, such as Ralf Dickel at the Oxford Institute for Energy Studies, make the case that blue hydrogen is needed in the short term because using renewable electricity to displace coal and gas power plants achieves deeper CO<sub>2</sub> curbs than using it to make green hydrogen.

Four of the biggest existing blue hydrogen schemes are in North America, and the UK government is funding three trial projects. Some advocates argue that such schemes will be an enabler for green hydrogen, helping to build infrastructure to tackle the fiddly question of getting hydrogen to where it is needed (see “A devil of a detail”). Others see blue hydrogen very differently. Because it still involves extracting gas, oil and coal, Friends of the Earth Europe has branded it “fossil hydrogen”, a lifeline for struggling fossil fuel firms.

Certainly, the sponsors of a group such as the UK’s All-Party Parliamentary Group on Hydrogen are a who’s who of fossil-fuel interests, including Shell, petroleum refiner Equinor, gas network firm Cadent and gas boiler-maker Baxi. But Tengler doesn’t buy the argument that such support is a cover for business-as-usual. “Just because they are fossil-fuel companies, we shouldn’t exclude them from the future,” he says.

There is, however, the undeniable problem that blue hydrogen doesn’t capture all the CO<sub>2</sub> released while making the gas. A first CCS stage removes between around 50 and 70 per cent. Adding a second, costly step takes that to 85 to 90 per cent,

with some pioneering projects aiming for more. Equinor’s H2H Saltend blue hydrogen scheme near Hull, UK, should capture 95 per cent of CO<sub>2</sub> using an alternative to steam reformation known as autothermal reforming.

Still, for most blue hydrogen schemes, at least 10 per cent of emissions aren’t captured. Tengler calculates that offsetting such carbon emissions with reforestation would require an area between the size of England and that of Spain, which is about four times as big. The scale of offsetting depends on what fossil fuel the hydrogen is extracted from and how much is being made by 2050.

He still thinks it is worth it, on the basis that using blue hydrogen still creates fewer emissions than burning coal, oil or gas. “There is that portion of emissions that just don’t get captured. Does that mean we don’t do it? I would say we still probably should. If there’s the option of blue or nothing, then do blue,” says Tengler.

Jan Rosenow at the Regulatory Assistance Project, a non-profit organisation that works to expedite a clean-energy transition, disagrees. He likens blue hydrogen to the coal industry’s attempts 15 years ago to promote “clean coal” plants fitted with CCS. That never happened, because the rapidly falling cost of alternatives including renewables rendered it uneconomical.

### **“Offsetting carbon emissions from hydrogen might need a forest the size of Spain”**

If not blue hydrogen, then what are the prospects for green hydrogen? The EU, for example, has less than 1 gigawatt of electrolyser capacity now, but in July 2020 it set ambitious targets of 6 GW by 2024 and 40 GW by 2030. Germany is working with Morocco to build a project using solar power.

A dizzying cast of big companies have entered or are planning to enter the green hydrogen fray, including oil giants Repsol and Shell and the world’s biggest offshore wind farm builder, Ørsted. Spanish electricity company Iberdrola is building a solar power plant to create green hydrogen in 2021, initially for conventional uses such as making fertiliser. “When we develop enough technology and scale, we can go for other sectors like the hard-to-abate, lorries, probably planes,” says Samuel Perez at Iberdrola. Analyst Rystad Energy, based in Norway, counts 60 GW of green hydrogen projects planned globally – but it expects only half will appear by 2035 due to high costs.

Closing the gap between the price of green and grey hydrogen will take time. Producing one kilogram of hydrogen requires about 50 to 55 kilowatt-hours of electricity (a medium-sized UK home uses about 8 kWh a day on average) and 9 to 10 litres of water. Up to 86 per cent of the costs of

green hydrogen are for electricity to power the electrolyzers. But wind and solar power costs have  
215 dropped rapidly in the past decade, and are expected to fall further.

The electrolyzers themselves account for the remaining cost. They are an old technology, but one that its makers claim can be made cheaper. Graham  
220 Cooley at UK manufacturer ITM Power says a 10 megawatt electrolyser costs half as much as it did three years ago, and the price will fall further, especially because of developments in China, now a major manufacturer of these devices.

225 Duncan Clark at Ørsted, which is in phase two of its Gigastack project using a wind farm off the Yorkshire coast of the UK to supply green hydrogen to a nearby oil refinery, says the technology is at a "special moment", akin to where offshore wind  
230 power was a decade ago before costs dropped dramatically and installations proliferated. "Only a few things are big and interesting enough to rival offshore wind, and green hydrogen is one of them," he says.

235 Even so, government interventions are likely to be needed, such as subsidies to make green hydrogen cheaper and carbon taxes to make grey hydrogen more expensive. "The market in the next 10 years is likely to be policy-driven. There will be a  
240 strong reliance on public funding for projects," says Bennett.

Source: [NewScientist](#)

### Carry on regardless?

Hydrogen's success may in the end be decided by society's willingness to pay for it. Green  
245 hydrogen will need billions, either through taxation or energy bills: Bloomberg New Energy Finance estimates that it will require \$150 billion over the next decade globally to bring the cost down to a competitive level. "Someone has got to pick up the  
250 bill," says Bennett.

Nonetheless, Bennett is optimistic that the current round of hype over hydrogen is different. This is partly because of the near-unanimity from different industries on its potential and partly  
255 because, for many hard-to-abate sectors, we have few alternatives on the table. "If we don't have [clean] hydrogen available by 2030 or 2040, we think we're going to be in a sticky place for some of these sectors," says Bennett.

260 "There are certainly risks on being overly bullish on the future hydrogen economy," he says. "But I think it's a bad time to be an out-and-out sceptic because there's clearly momentum and funding going into projects in the short term regardless."  
265 The question today no longer seems to be if hydrogen will help us fight climate change, but a matter of whether it ends up as the star turn or just a bit player.

### LISTENING – Can hydrogen help the world reach net zero? | FT Film (24'46)

<https://www.youtube.com/watch?v=v7UwbJ8n9L0>

00:00 What is Hydrogen

00:50 Green Hydrogen

02:50 Current uses of hydrogen

04:10 The concerns

05:00 The Hydrogen rainbow

05:51 Emerald Hydrogen

07:35 The investors

10:50 The policymakers

13:40 Green steel

17:35 Cleaning up aviation

22:15 The hydrogen economy of the future

### LISTENING – The truth about hydrogen | DW Planet (12'07)

<https://www.youtube.com/watch?v=AGTjKJHu99c>

00:00 Intro

00:37 What is hydrogen?

01:34 How can we use the stuff?

04:41 The hydrogen rainbow

08:49 No silver bullet

10:47 What's next for hydrogen?

## **READING 3**

### **Six uses for Hydrogen**

#### **1 TRAINS, PLANES AND...**

The glossiest of many new uses touted for hydrogen is in transport. Hydrogen cars have faltered before, as oil prices yo-yoed and battery powered electric cars emerged as a viable technology. But for larger vehicles, the batteries required are big and heavy, possibly creating an opening for hydrogen.

Two hydrogen fuel-cell trains built by the firm Alstom were put into commercial service in Germany in 2018, and one in Austria in 2020. The UK has also been trialling this approach on its rail network.

Hydrogen's high energy content in relation to its weight has also caught the eye of plane-makers. In the UK, 2020 saw the flight of a six-seater hydrogen passenger plane, while European aerospace firm Airbus unveiled three concept hydrogen planes.

"When we go to larger commercial aircraft-type applications, we see the need for hydrogen, because in very simple terms it has thousands of times more energy per kilogram than even the best batteries today," says Glenn Llewellyn at Airbus. Julian Renz at green aviation company ZeroAvia, which undertook the six-seater test flight, says he thinks hydrogen-powered planes will be cheaper to maintain than battery ones, because of the limited life cycle of batteries.

#### **2 AUTOMOBILES**

While most analysts think battery electric vehicles are the future for passenger cars, some car-makers believe that the faster refuelling of hydrogen vehicles will win the day in some places. "I definitely see a market for hydrogen passenger cars," says Mark Freymüller at Hyundai. Under a European scheme, in which Hyundai is offering cars on a pay-per-use model, the vehicles are fuelled solely with green hydrogen. "It is important to be emission-free," he says. Hydrogen trucks may also prove more viable than battery electric lorries, because of the size and weight of battery needed to power a lorry.

#### **3 HOME HEATING**

Many uses for hydrogen are mooted, but some are far from guaranteed to materialise. One is decarbonising home heating, with proponents arguing that countries, including the UK, could repurpose existing gas pipe networks to carry hydrogen and swap natural gas boilers for ones capable of burning hydrogen.

Leeds in the UK has been mooted as an early candidate for switching entirely to hydrogen instead of natural gas for heating and cooking, with a 2016 report by the local energy network finding the idea "technically possible and economically viable". In November, the UK government said it would support a village-scale hydrogen heating trial by 2025.

Sceptics say it would be more efficient to use renewable electricity directly with heat pumps to warm homes, rather than losing energy by converting it to hydrogen first. A recent report by Jan Rosenow and a team at the UK Energy Research Centre concluded that there is so much uncertainty about hydrogen's role in decarbonising heat that other options should be the UK's priority in the next decade. These include networks that pipe heat to many homes from a large, central source such as an industrial plant, energy efficiency improvements and heat pumps.

#### **4 SUPPORTING THE GRID**

Firms running electricity grids like hydrogen. The National Grid ESO in the UK says it must be deployed if we are to achieve net-zero emissions, and sees hydrogen supplying the flexibility that natural gas does today, by providing electricity when wind and solar output is low, or heating during cold snaps. "It has the potential to provide a lot of flexibility," says Rob Gibson at National Grid ESO.

#### **5 HEAVY INDUSTRY**

Steel is one of the world's biggest carbon emitters, partly due to the coking coal used in the production of the metal from iron ore. In August, operations started at a steel-making plant in Sweden to use hydrogen instead of the coal, which produces water instead of carbon dioxide. The project, called HYBRIT, aims to make fossil-free steel commercially available by 2026. Any scale-up will require green or blue hydrogen (see main article) to make the switch worthwhile.

Oil refineries are one of the biggest users of hydrogen today, mainly to lower the sulphur content of diesel fuel. That is partly why projects such as Ørsted's Gigastack hydrogen production plant in the north-east of England have sited an electrolyser, powered by an offshore wind farm, next to a refinery.

## 6 MAKING GREEN AND BLUE

Shell is among the companies exploring whether the port of Rotterdam in the Netherlands could host the world's biggest green hydrogen scheme. Spanish oil firm Repsol is eyeing the possibility of making green hydrogen next to its refineries. Far bigger green hydrogen projects are being floated, such as Australia's vast "Asian Renewable Energy Hub" to use renewable electricity to produce hydrogen for use domestically and for export to Asia.

Blue hydrogen projects, which use natural gas to make hydrogen but capture most of the carbon dioxide that is usually released in the process, include Equinor's Saltend plant in the UK. The company hopes to make a final investment decision on this in 2023. It has applied for UK government funding. Other blue hydrogen proponents include fossil fuel companies such as Woodside, Australia's biggest oil and gas producer, and the government of Alberta in Canada, which hopes to use the approach to reduce CO<sub>2</sub> emissions in the state, which is better known for its highly polluting tar sands oil fields.

## A DEVIL OF A DETAIL

While hydrogen has many potential advantages as an energy carrier (see main story), it poses some significant problems. While containing a lot of energy per unit mass (high gravimetric energy density), hydrogen takes up a lot of space (low volumetric energy density). What's more, hydrogen molecules are so small they can leak out of a container.

Both factors make storing and moving it problematic. "Hydrogen is a devil of a thing to transport," says Thomas Baxter at the University of Aberdeen, UK. "That's why most hydrogen plants are adjacent to the use."

It means visions of countries with big renewable electricity generation resources becoming exporters of "green" hydrogen are just that for now, visions. Such ambitions are a key plank, for example, of Australia's National Hydrogen Strategy, published in November 2019, but are seen as a long way off, given the volumes required and the extra costs of liquefying hydrogen and shipping it. "For the time being, we would expect local production is where all the projects will be," says Simon Bennett at the International Energy Agency.

To fulfil hydrogen's potential, more transport capacity will be needed generally, be it by tanker truck, ships or pipes – many of which will need upgrading to carry hydrogen without leaks.

Source: [NewScientist](#)

## PHONOLOGY

Chase the odd one out.

Circle the odd man out, then find the different vowel sounds

	Main vowel sound	Odd one out
1. biofuel – mine – hydrogen – wind - turbine		
2. energy – well – thermal – bury – a record		
3. ocean – solar – photovoltaic – biofuel - fossil		
4. panel – fossil – carbon – supply - burn		
5. waste – shale – station – phase – gases		

A citizens' assembly is a group of people who are brought together to learn about and discuss an issue or issues, and reach conclusions about what they think should happen. They enable decision-makers to understand people's informed and considered preferences on issues that are complex, controversial, moral or constitutional.

<https://www.parliament.uk/get-involved/committees/climate-assembly-uk/about-citizens-assemblies/>

### **The situation**

**You have been chosen to take part in Energy Assembly UK, The Path to Net Zero. You are part of the focus group dealing with the issue of hydrogen.**

**Energy Assembly UK will host a discussion between assembly members who will present their arguments to the Assembly so that they come up with a list of 5 to 10 recommendations.**

### **Participants (tailor to each group)**

#### **1. Delegates are hosting and mediating the discussion**

- Delegates will present the history of hydrogen as well as the questions raised that need to be answered today.

#### **1. Panels of speakers**

##### **a) Production**

- an economist
- 1 or 2 scientists to present hydrogen technologies
- 1 or 2 environmentalists to present the pros and cons of hydrogen production

##### **b) Transport and storage**

- an economist
- 1 or 2 scientists to present the upsides of hydrogen (the possibility to store energy produced by renewables, for instance)
- 1 or 2 engineers to explain the storage/safety issues

##### **c) Individual usage**

- 1 engineer to explain how fuel cells work
- 1 economist to present hydrogen cars (sales, infrastructures, problems, efficiency rate)
- 1 engineer to contrast hydrogen and electric cars
- 1 researcher to show the limits of hydrogen for home heating
- 1 industrialist to talk about freight and lorries

### **Proceedings**

- The delegates will open the discussion by presenting the history of hydrogen and the questions raised
- The experts will present their findings
- The delegates will then come up with a list of recommendations to address to the UK Parliament.

## A. Sounds & Symbols

### 1) I.P.A. for English (British English, RP = Received Pronunciation)

Consonant sounds			Short sounds	Long sounds	Diphthongs
p pet	b bad	h how	ɪ hit	i: see	əʊ nose
t tea	d did	m man	ʊ put	u: blue	aʊ now
k cat	g give	n no	æ cat	ɑ: arm	eɪ ray
f find	v voice	ŋ <u>sing</u>	ʌ cup		aɪ five
θ think	ð this	r red	ɒ hot	ɔ: call	ɔɪ boy
s sun	z zoo	l leg	ə <u>away</u>	ɜ: turn	ɪə near
ʃ she	ʒ pleasure	w wet	e met		eə where
tʃ check	dʒ just	j yes			ʊə pure

### 2) VOWEL SOUNDS: complete this table

1. / / Doctor, <u>collect</u> , <u>vanilla</u> , another	DIPHTONGS
2. / / Dog, what, cough, want, glove, shone	13. / / <b>Home, no, road, toe, though, show, low,</b>
3. / / Bird, word, third, earn	14. / / Fear, dear, fierce, idea, here
4. / / tree, beat, seize, piece	15. / / House, cow, town, allow, bough, thou,
5. / / <b>Horse, door, lawn, bought, talk,</b>	16. / / Care, fair, bear, there, dare
6. / / <b>Class, part, <u>after</u>, heart, laugh, dark</b>	17. / / Tour, cure, endure, dual
7. / / <b>Pen, head, says, friend, <u>leather</u></b>	TRIPHTONGS
8. / / <b>Bad, sat, sad, plait, <u>exam</u></b>	18. hour : / /
9. / / Wolf, book, look, <u>woman</u> , could	19. player : / /
10. / / <b>lit, <u>symbol</u>, <u>England</u>, build, women</b>	20. tyre : / /
11. / / Spoon, move, group, boot	21. lower : / /
12. / / <u>Some</u> , come, blood, does, cut, <u>other</u>	22. employer : / /

### 3) The Alphabet – You surely know the alphabet, but how well can you pronounce all the letters? Put the letters in the right column, according to the pronunciation of the vowel.

1 /eɪ/	2 /i:/	3 /e/	4 /aɪ/	5 /əʊ/	6 /u:/	7 /ɑ:/

### 4) Vowel phonemes - Chase the odd man out:

	Main vowel sound	Odd man out
Low – no – show – <u>allow</u> – throw		
How – law – now – cow – shout		
Fault – nought – wrote – fought – door		
Lean – niece – feed – <u>leather</u> – teeth		
Tool – shoot – crook – blue – <u>balloon</u>		
Fire – hire – <u>retire</u> – <u>Yorkshire</u> – higher		

### 5) Focus on vowel sounds:

Choose the right sound for the vowel in bold character.

- |                |      |      |      |            |      |      |      |
|----------------|------|------|------|------------|------|------|------|
| 1. Climate     | [aɪ] | [ɪ]  | [i:] | 6. Dioxide | [i]  | [aɪ] | [i:] |
| 2. Global      | [ɒ]  | [əʊ] | [ɔ:] | 7. Flood   | [ʊ]  | [u:] | [ʌ]  |
| 3. Natural     | [ɑ:] | [eɪ] | [æ]  | 8. Nitrate | [aɪ] | [ɪ]  | [i:] |
| 4. Radioactive | [eɪ] | [æ]  | [e]  | 9. Waste   | [eɪ] | [æ]  | [e]  |
| 5. Change      | [æ]  | [eɪ] | [ʌ]  | 10. Sort   | [ɔ:] | [ɒ]  | [aʊ] |

## Word Stress

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When a word has more than one syllable, a single syllable within the word is given more emphasis than any of the other syllables. That syllable is considered to be the stressed syllable. The vowel sound of the stressed syllable is emphasized by being pronounced longer, louder, and often at a higher pitch than the surrounding syllables.

The symbol / ' / is used to represent the stressed syllable of a multi-syllable word.

### PRACTICE :

Use your dictionary to find the stressed syllable for these words and complete the table with the stressed syllable in the dark box:

Alternative		Al	ter	na	tive
Climate			cli	mate	
Desert					
Electric					
Electricity					
Extinction					
Generation					
Global					
Polluted					
Pollution					
Radiation					
Ultraviolet					
Warming					



## B. Intonation

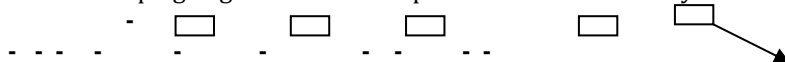
### 1. Cas général : Intonation descendante

Dans les phrases déclaratives (affirmatives et négatives), impératives et dans les questions en Wh- (phrase 1), la voix marque une chute à partir de la dernière syllabe accentuée, cette chute indiquant la fin de la phrase.

1) Who called you?



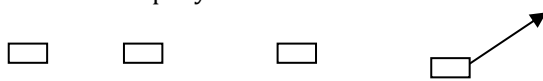
2) This is a campaign against the whole pharmaceutical **industry**.



### 2. Cas particulier : Intonation montante

Dans les questions fermées (Yes-No questions) et les demandes de confirmation, la voix marque une montée à partir de la dernière syllabe accentuée.

3) Have the company's staff been **threatened**?

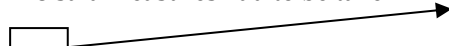


4) Could the campaign seriously hurt medical **research**?



6) A: "Tom Lay said measures had to be taken."

B: "**Who** said measures had to be taken?"



### 3. Accent contrastif ou focus

Le locuteur a toujours la possibilité d'accentuer plus particulièrement un terme dans le but de l'opposer à un autre, exprimé ou sous-entendu.

7) Some British activists criticized the Secretary's speech.

8) Some **British** activists criticized the Secretary's speech (not **American** ones).

9) Some British activists **criticized** the Secretary's speech (they did not **praise** it).

10) Some British activists criticized the **Secretary's** speech (not the **Prime Minister's**).

VOWELS	monophthongs				diphthongs		<b>Phonemic Chart</b> voiced unvoiced		
	ɪ: sheep	ɪ ship	ʊ good	u: shoot	ɪə here	eɪ wait			
	e bed	ə teacher	ɜ: bird	ɔ: door	ʊə tourist	ɔɪ boy			əʊ show
	æ cat	ʌ up	ɑ: far	ɒ on	eə hair	aɪ my			aʊ cow
CONSONANTS	p pea	b boat	t tea	d dog	tʃ cheese	dʒ June	k car	g go	
	f fly	v video	θ think	ð this	s see	z zoo	ʃ shall	ʒ television	
	m man	n now	ŋ sing	h hat	l love	r red	w wet	j yes	

### Interactive phonemic charts:

<https://www.englishclub.com/pronunciation/phonemic-chart-ia.php>

You can also download the British council's app on your phone :

<https://learnenglish.britishcouncil.org/apps/learnenglish-sounds-right>