

SDG 13: Climate Action

This module focuses on SDG 13 which aims to “Take urgent action to combat climate change and its impacts.” The stories include exploring the role of rice farming practices in climate change and renewable energy in the Philippines. Activities include reading and analyzing stories, exploring climate science, researching local climate impacts, and proposing sustainable solutions.

Link to Subjects	Science (Earth/Climate)	Link to Competencies	To add
Link to Indiana High School Core	To add HS-ESS2-2 HS-ESS2-4 HS-ESS3-4 GHW.12.1	Link to International Baccalaureate	To add
Stories	#1 Rice Gets Reimagined, From the Mississippi to the Mekong #2 Powering Progress: A Renewable Revolution		
Activities	Activity 1 Introduction to Climate Science	Activity 2 Impacts of Climate Change: Bringing it Home	Activity 3 Sustainable Solutions Showcase
Type of Activity	Discussion & Presentation	Student-led Local Research	Student solutions competition
Time of Activity	1 class	1-2 classes	1-2 classes

Key Questions & Terms

Key Questions	Key Terms
How does Global Climate Change impact ecosystems and societies? What strategies can be used to respond to Climate Change? What strategies are used to mitigate climate change? How can adaptation strategies be used to reduce the impacts of Climate Change on communities? How is this SDG related to other SDGs?	• Greenhouse Effect • Greenhouse Gas • Climate Change • Mitigation • Adaptation • Resilience

Story Summaries

Story #1: Rice Gets Reimagined, From the Mississippi to the Mekong

Rice cultivation faces grave threats from climate change, jeopardizing food security for billions. Increasing temperatures, erratic rainfall, and rising sea levels challenge traditional farming practices. Scientists and farmers worldwide are innovating new rice varieties, cultivation techniques, and methane reduction strategies to adapt to the changing climate and ensure future food security.

Full story here: Sengupta, S. & Thuy, T. L. (May 20, 2023). Rice Gets Reimagined, from the Mississippi to the Mekong. New York Times. Retrieved from <https://bit.ly/4bPv4v2>.

Story #2: Powering Progress: A Renewable Revolution

In Manila, Senator Isabel Reyes spearheads a transition to renewable energy, balancing economic development and environmental sustainability. She initiates policies incentivizing investment in solar, wind, and hydroelectric power, and supports worker transition from fossil fuels to renewables. Despite challenges, the Philippines becomes a model for sustainable development, inspiring other nations. [Full Story #2](#)

Opening Discussion:

1. Have students read one of the stories. Working in pairs or small groups, students should respond to the the following questions
 - a. What problems are the people in the story facing?
 - b. How do they respond to these problems?
 - c. What principles and ideas shape their solutions/responses to the problems?
 - d. How do these stories about Climate Change relate to other SDGs?
2. Through the discussion draw out the following key ideas:
 - a. Global Climate Change has a wide array of local **impacts on ecosystems and societies**
 - b. Strategies to respond to Climate Change can be preventative (**mitigation**), or responsive (**adaptation**) or **both** at the same time.
 - c. **Transitioning energy systems** away from GHG emitting technologies is a critical component of **climate mitigation**.
 - d. **Climate adaptation** strategies aim to reduce risk and vulnerability to climate change, strengthen resilience, enhance well-being and the capacity to anticipate, and respond successfully to change.
 - e. For both mitigation and adaptation, **capacity building** processes are needed to develop new technologies, skills and practices that support transition.
 - f. **Community engagement and advocacy** is a critical part of ensuring that mitigation and adaptation efforts are effective and equitable.
 - g. **SDGs are interconnected** - addressing climate change can also impact other SDGs.

Activity #1: Introduction to Climate Science

Students will read and discuss the framing stories. They will then provide a brief presentation on their understanding of relevant concepts related to climate change, climate action, and the differences between mitigation and adaptation.

Activity Learning Objectives

1. Students understand how climate change affects people throughout the world
2. Students identify climate actions that can be taken by individuals, communities, and policymakers.
3. Students are able to explain the connection between climate change and the Sustainable Development Goals.
4. Students can explain the difference between climate mitigation and adaptation.

Teacher preparation

1. Review the stories
2. Adapt the discussion questions and presentation activity using the graphics and data provided below in the Resources section.
3. Identify the data / charts that you want to provide to students for the activity.

Student preparation

1. None (or potential background reading on the topics)

Lesson Flow

1. Organize students into small groups
2. Provide each group of students with data and charts that demonstrate key areas of knowledge and data about climate change.
 - a. You can use the materials in Resources to create a set of slides or create your own: [Slides and images for basic climate science information](#)
3. Have students develop their own talking points that explain and connect the content from the slides, forming a coherent story of how humans are impacting the energy balance of the planet.
4. Have the groups pair up and present to each other and discuss the different ways in which they told the story.

Possible Enrichment

Ask students to do additional research to inform their presentations and organize the presentations during a subsequent class. You might also consider inviting expert speakers or supplementing the lesson with a short TED Talk on climate change and climate action.

References

Sengupta, S. & Andreoni, M. (2024, April 18). Drought Pushes Millions into “Acute Hunger” in Southern Africa. *New York Times*. Retrieved from <https://bit.ly/3ySgBjB>.

Activity #2: Impacts of Climate Change

In this activity, students will conduct research on climate impacts in their local area. This could be focused on environmental or social impacts. Students then present their findings in class.

Activity Learning Objectives

1. To explore and understand the impacts of climate change on local ecosystems and communities.
2. To communicate the significance of anticipated climate change impacts and identify trends that span different locations and communities.

Student preparation

1. Prior to class, students individually research the social and ecological impacts of climate change on a specific site - (perhaps their self-identified home place or a different location of interest).

Lesson Flow

1. In class, students present their findings in small groups (3-4 students), taking notes on one another's case studies.
2. As a whole class, students share impacts from one another student's site, making connections and identifying patterns in impacts that are both local and global.

Possible Enrichment

Consider inviting members of the community to attend the class presentations.

Final Notes

Students can conduct research in class, supported by the teacher, or at home as homework if time is limited.

Activity #3: Sustainable Solutions Showcase

Students develop proposed climate actions to address climate mitigation or adaptation. They then present their practice/policy to the class. This can be converted into a competition if desired.

Activity Learning Objectives

1. To promote research and presentation skills while exploring climate mitigation and adaptation practices.

Teacher preparation

1. Identify sufficient practices to assign one to each group of students

Student preparation

1. Review Project Draw Down's list of Climate Solutions: <https://bit.ly/3Vz7HQL>

Lesson Flow

1. Instruct each student or small group to review and select a Climate Solution from Project Draw Down's list of Climate Solutions: <https://bit.ly/3Vz7HQL>
2. In a showcase-style presentation, students share their research on the chosen practice, highlighting its benefits, challenges, and potential for replication in different regions.
3. Encourage a Q&A session to foster critical thinking and discussion.

Possible Enrichment

Ask students to identify their own practices. Ask students to compare the practice in at least two different contexts.

References

- Find out more about Project Drawdown here: <https://drawdown.org/>

Advanced Approaches

Community Engagement and Action Project

Objective: To empower students to take proactive roles in addressing climate change and sustainability in their own communities.

Activity:

1. Guide students to identify a specific climate-related issue in their local community.
2. In small groups, students develop and implement a community action project, which could include awareness campaigns, workshops, or initiatives to promote sustainable practices.

Students document their project, reflecting on challenges faced and lessons learned, and present their findings to the class.

World Climate simulation

Objective: To engage students with the challenges and considerations in negotiating Climate agreements, and develop their understanding of the scope and scale of action needed to limit Climate Change to 1.5F above pre-industrial levels.

1. Assign each student a nation to represent at a simulated Climate Summit. Provide students with briefing materials appropriate for their nation.
2. Give an introductory presentation opening the summit and explaining the negotiation process. Introduce the use of the C-ROADs Climate Model.
3. Students negotiate multiple rounds of Carbon Reduction, Land Use and Climate Finance Commitments, seeking to keep Global Average Temps from rising to 1.5F above pre-industrial levels.
4. Debrief the negotiations to extract lessons learned about Global Climate Negotiations, and the scale of action required to meet Paris Agreements.
5. Visit Climate Action Tracker to explore the status of the assigned nation's Climate Commitments and understand what the nation needs to do to meet Paris Goals

Full Story Text

Story #2: Powering Progress: A Renewable Revolution

Source: This story was created by Ben Gillock with input from ChatGPT.

In the bustling city of Manila, policymakers find themselves at a crucial crossroads. The growing demand for energy to fuel the nation's development clashes with the environmental toll of traditional energy sources. As coal-fired power plants dominate the skyline, the need for change becomes apparent to leaders like Senator Isabel Reyes.

Senator Reyes, driven by a vision of a sustainable and equitable future, grapples with the challenge of transitioning the country to renewable energy while ensuring that economic development continues to uplift those in poverty.

Senator Reyes initiates a comprehensive legislative framework to incentivize the adoption of renewable energy sources. She collaborates with experts, economists, and environmentalists to draft policies that encourage the private sector to invest in solar, wind, and hydroelectric power. The goal is not only to mitigate climate change but also to create jobs and stimulate economic growth.

Recognizing the need for a just transition, Senator Reyes ensures that policies prioritize regions heavily dependent on traditional energy sources. The plan includes skill development programs to transition workers from the fossil fuel industry to the renewable energy sector, offering a pathway to economic stability for affected communities.

Across the archipelago, local leaders and entrepreneurs become the champions of this renewable revolution. In Mindanao, a community-driven solar energy project takes shape, providing electricity to remote villages that were previously off the grid. The initiative not only empowers the community but also sparks interest in other regions.

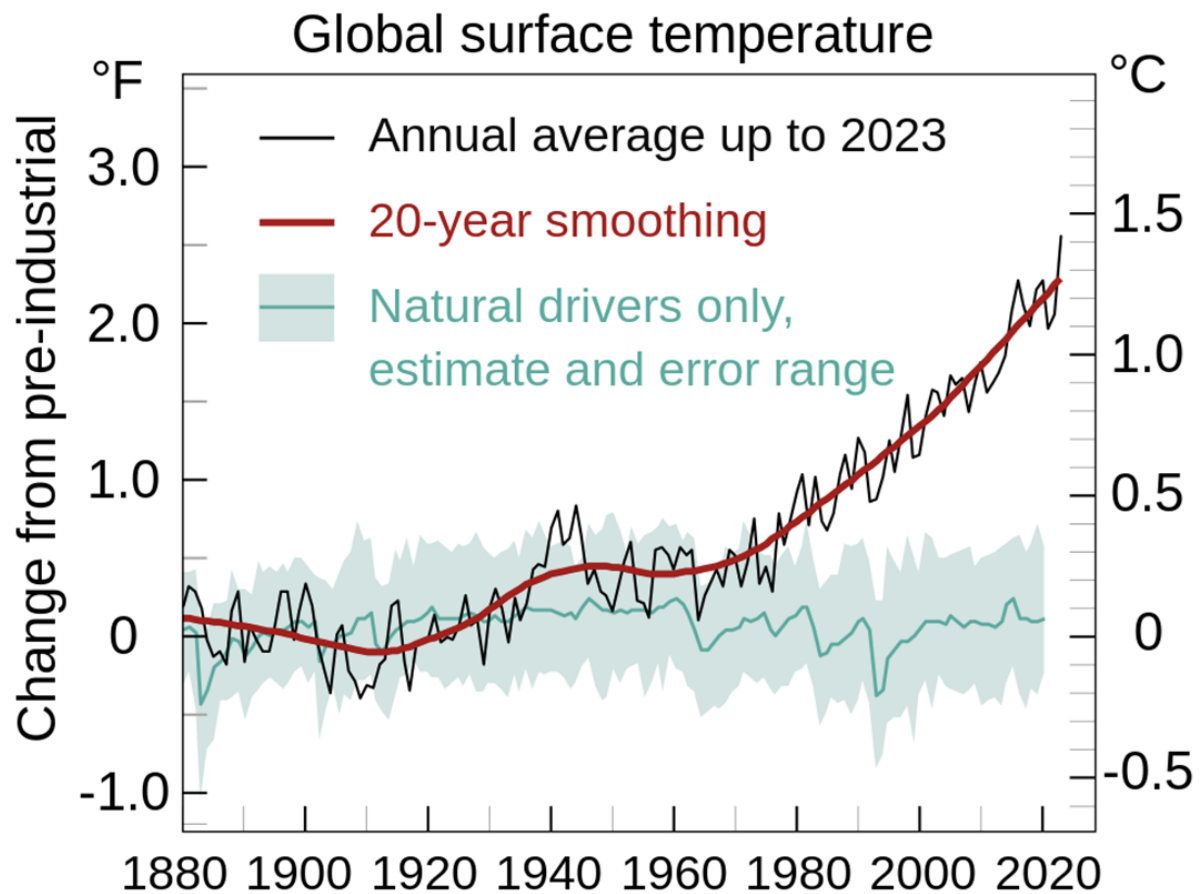
In Cebu, a wind farm emerges as a symbol of progress, creating jobs and reducing reliance on fossil fuels. Local entrepreneurs seize opportunities to invest in renewable energy startups, driving innovation and economic diversification.

While the transition faces challenges, such as initial investment costs and resistance from established energy players, Senator Reyes remains steadfast. She navigates political complexities, mobilizes public support through awareness campaigns, and collaborates with international organizations to secure funding for renewable projects.

As the transition gains momentum, the Philippines becomes a beacon of success in balancing economic development and sustainability. Energy poverty diminishes, and the nation achieves significant reductions in carbon emissions. The success stories of local communities embracing renewable energy inspire other nations facing similar challenges.

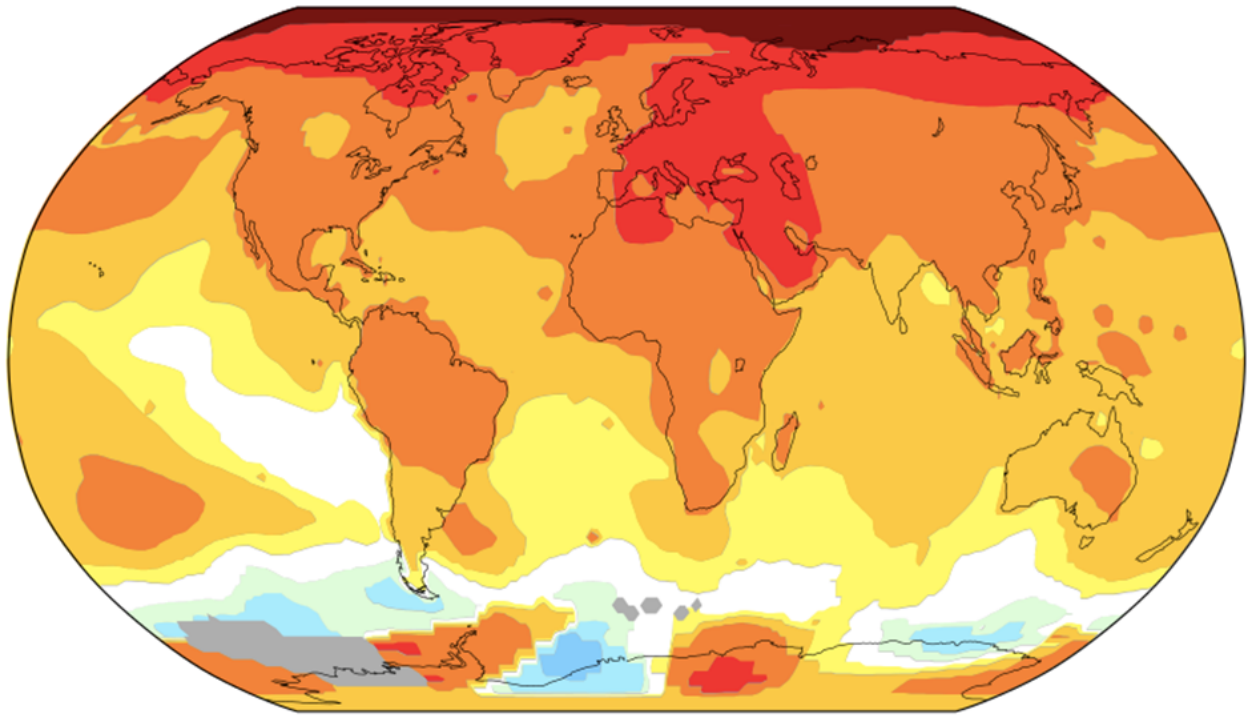
Resources

Slides and images for basic climate science information

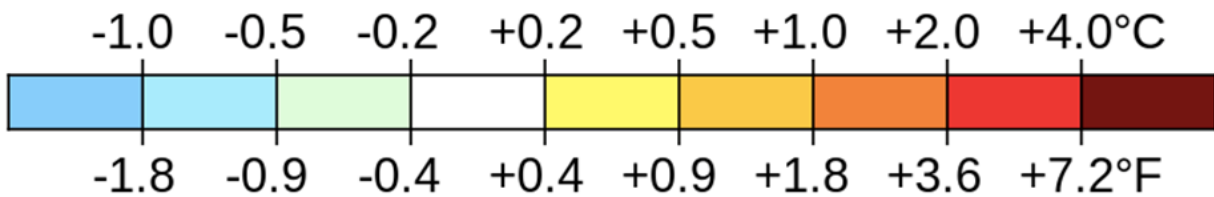


Source: Wikimedia. (2024). Global Temperature and Forces. Retrieved from <https://bit.ly/4e9CbAd>. Data from NASA <https://bit.ly/3KAuHsk>.

Temperature change over the past 50 years

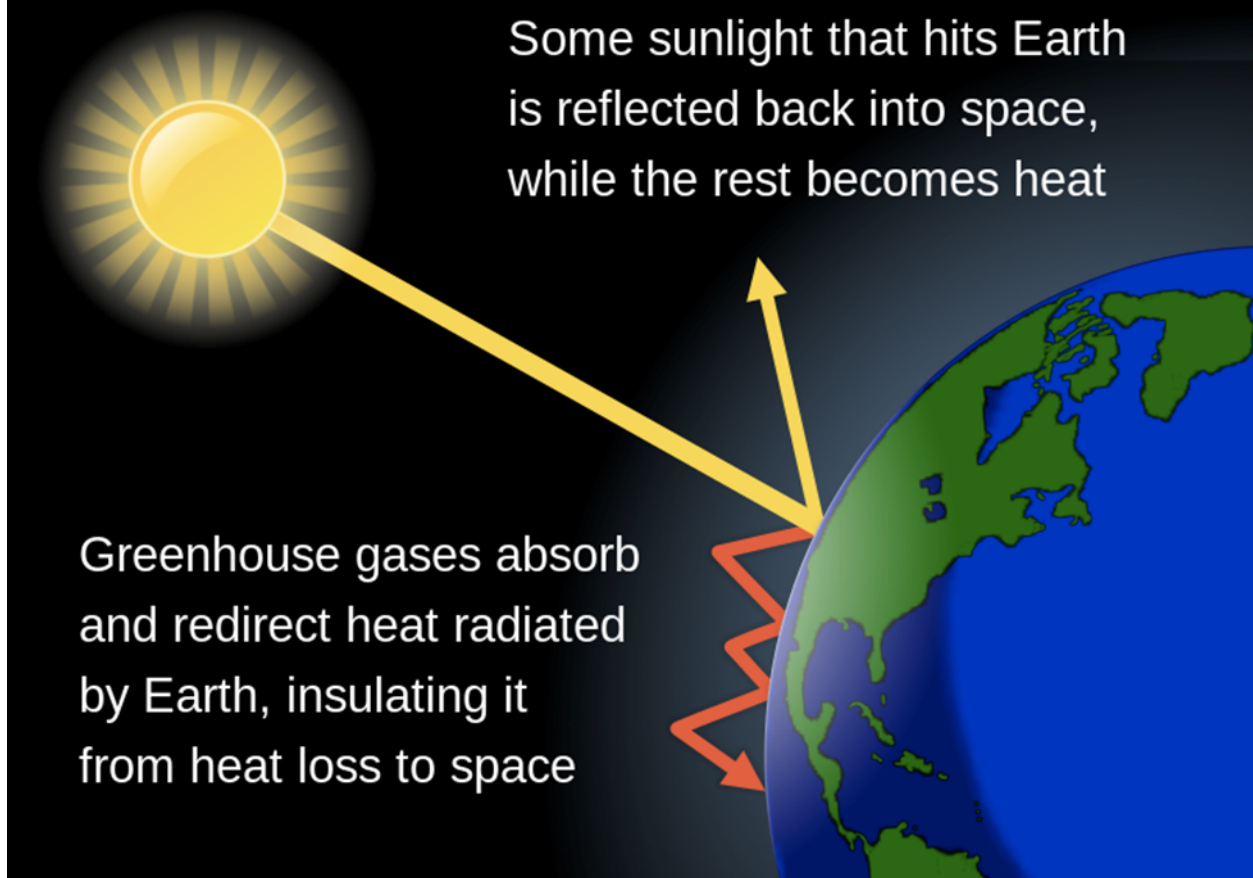


Trend from 1973 to 2023

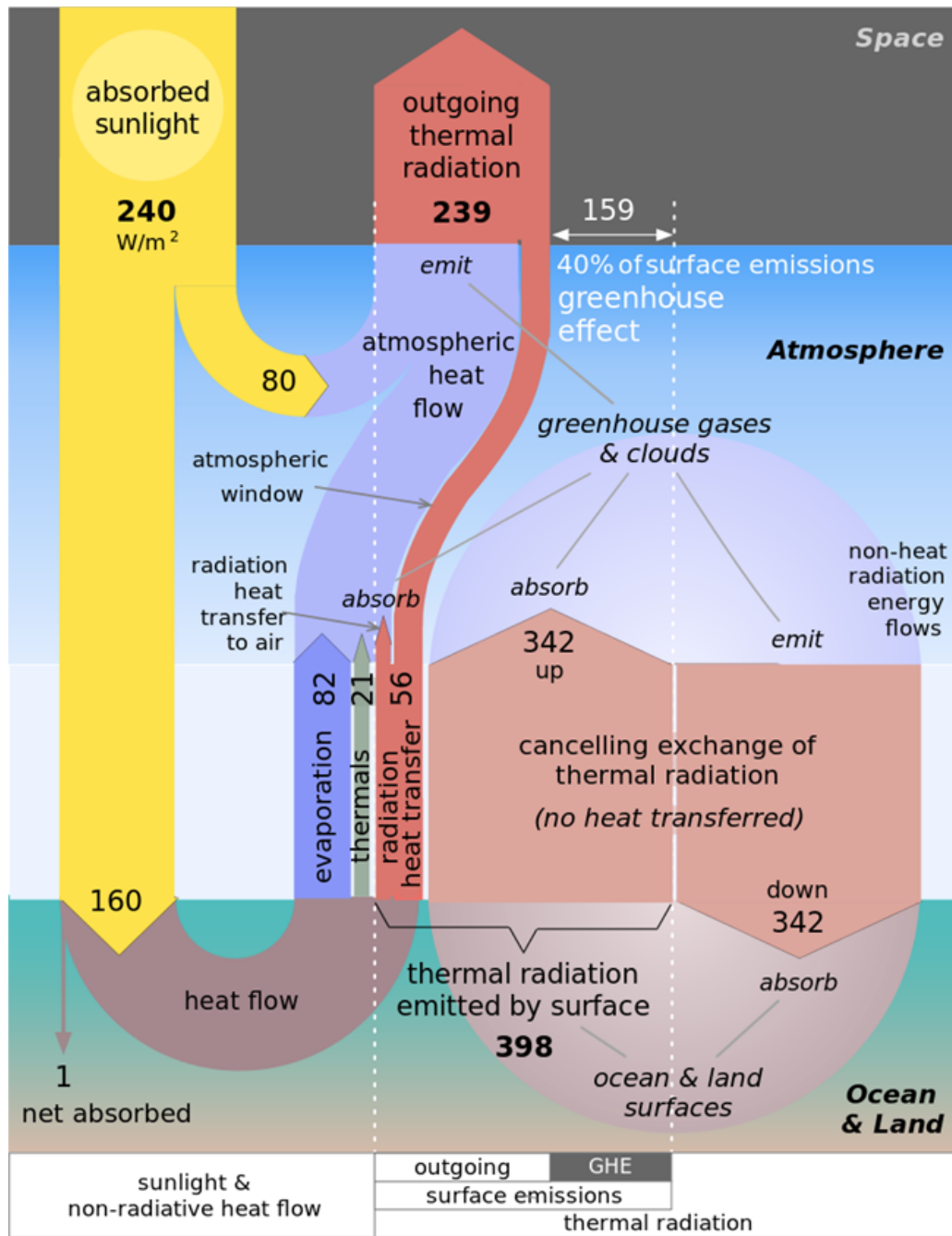


Source. Wikimedia. (2024). Change in Average Temperatures. Retrieved from <https://bit.ly/3Xg1gDi>. Data source NASA <https://bit.ly/4bbQ8el>.

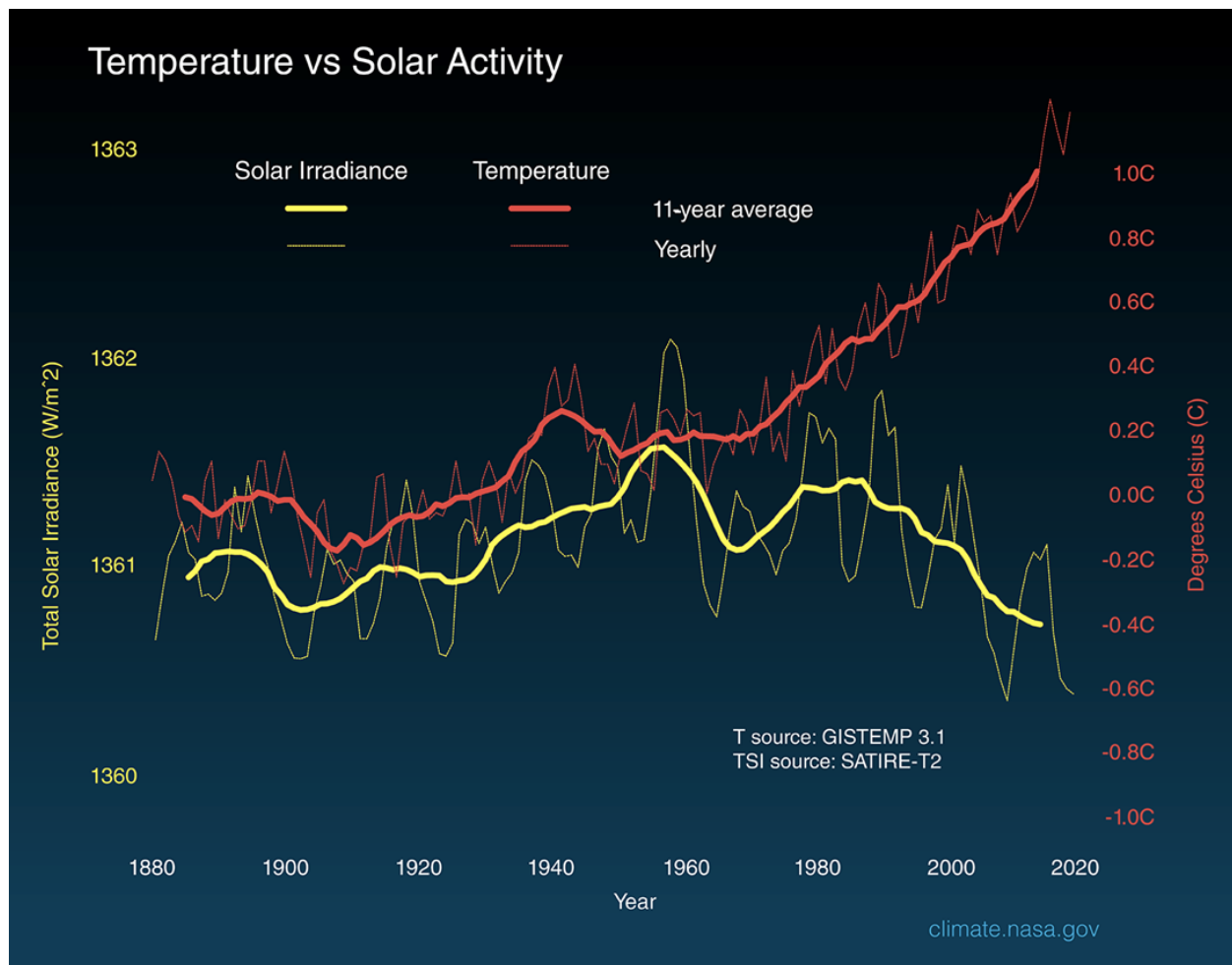
The Greenhouse Effect



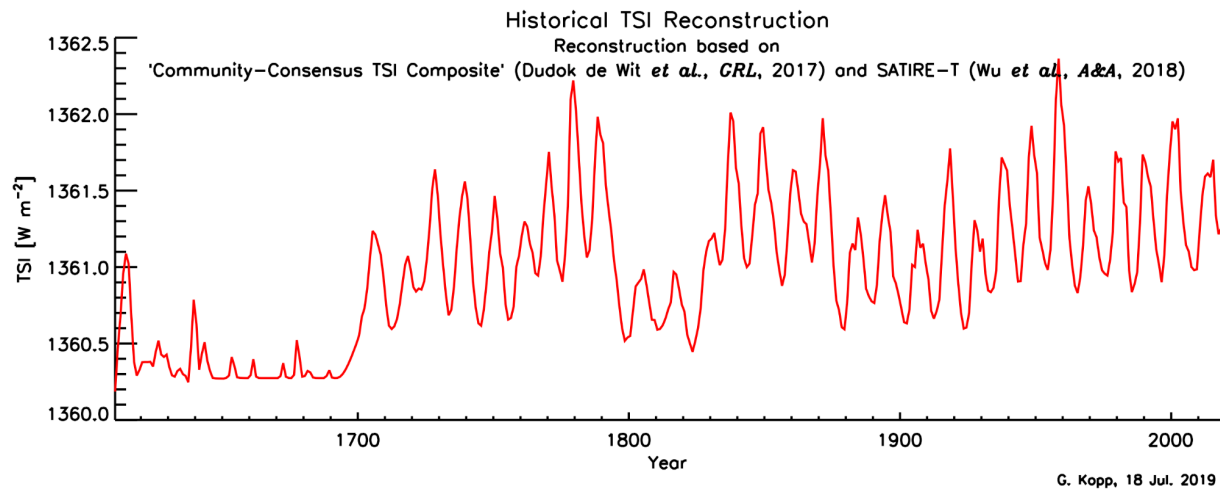
Source: Wikimedia. (2020). Climate Change Schematic. Retrieved from <https://bit.ly/3XnRU4>.



Source: Wikimedia Commons. (2023). Earth Energy Budget with GHE. Retrieved from <https://bit.ly/3VjzmDN>. Data sources from Forster, P., Storelvmo, T., Armour, K., Collins, W., Dufresne, J. L., Frame, D., ... & Zhang, H. (2021). The Earth's energy budget, climate feedbacks, and climate sensitivity. In V. Masson-Delmotte, P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, ... & B. Zhou (eds.), *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (pp. 923–1054). Cambridge University Press. doi:10.1017/9781009157896.009



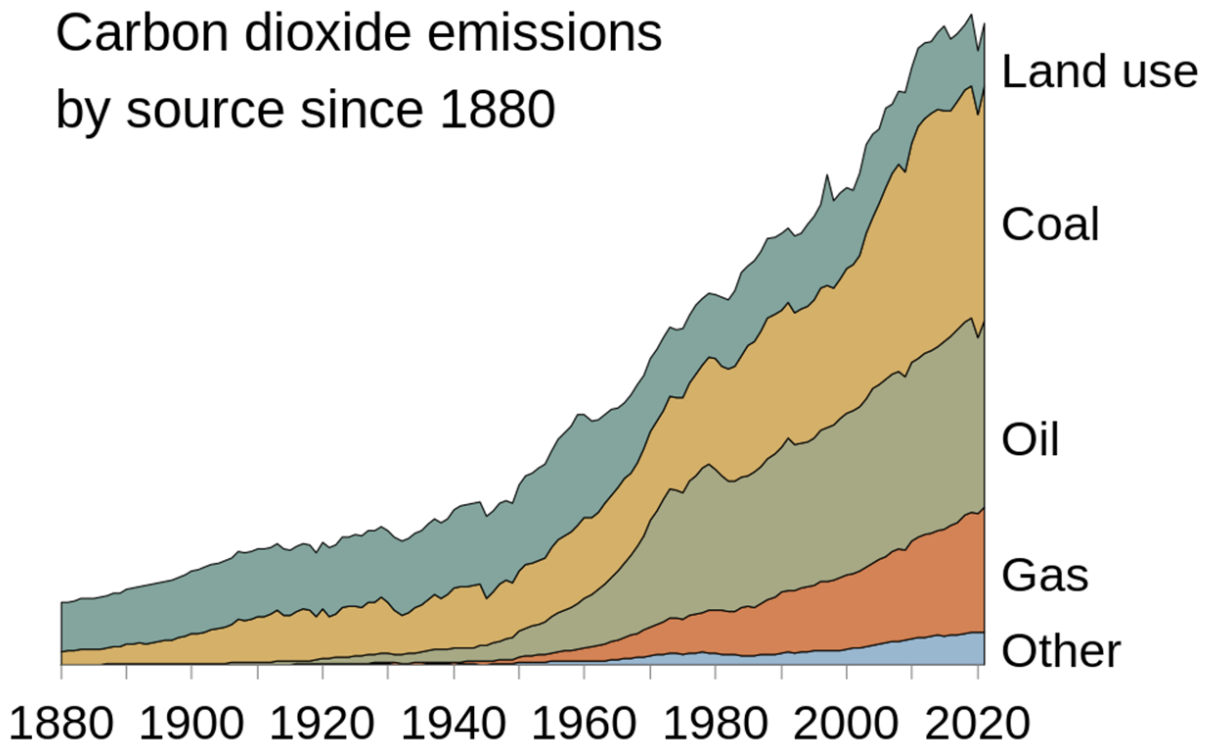
Source: NASA. (2019). Graphic: Temperature vs. Solar Activity. Retrieved June 10, 2024 from <https://bit.ly/4bSvHEe>



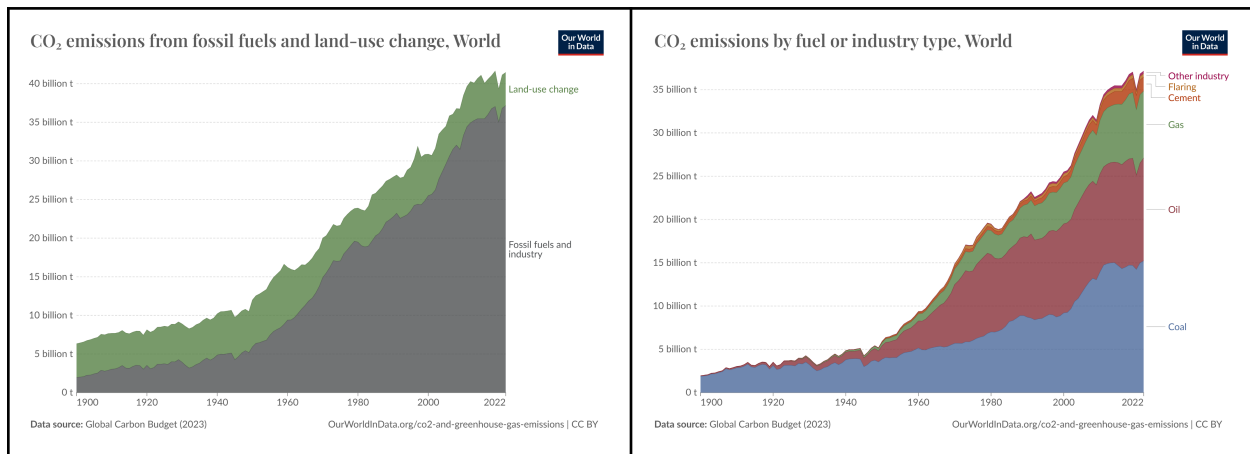
Source: Figure created by Kopp, G. Retrieved June 10, 2024 from <https://bit.ly/4bbFKTT>. Data sources include:

- Kopp, G., Krivova, N., Lean, J., and Wu, C.J. (2016). The Impact of the Revised Sunspot Record on Solar Irradiance Reconstructions. *Solar Physics*, 291(2016), pp. 2951–2965. doi: 10.1007/s11207-016-0853-x
- Wu, C.-J., Krivova, N. A., Solanki, S. K., Usoskin, I. G. (2018). Solar total and spectral irradiance reconstruction over the last 9000 years. *Astronomy & Astrophysics*, 620(December), A120, pp. 1-12. doi: 10.1051/0004-6361/201832956

Carbon dioxide emissions by source since 1880



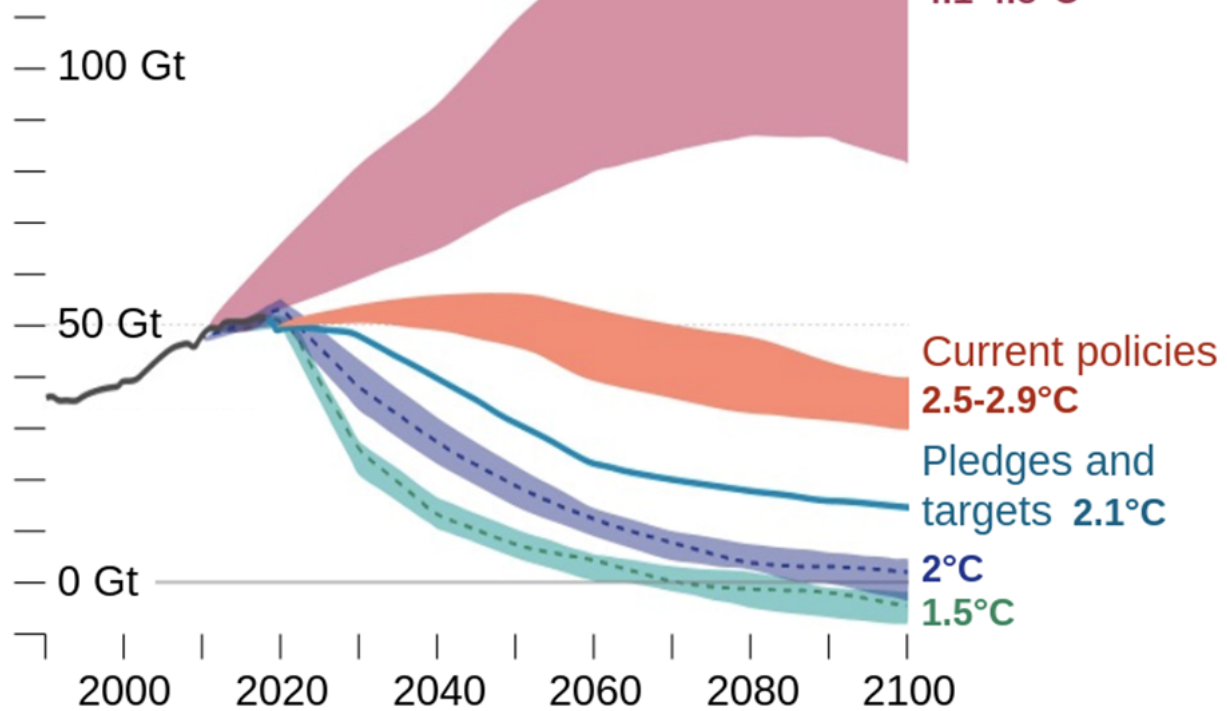
Source: Zelke, F. (n.d.). Net Zero – 100% Decarbonization. Retrieved from <https://bit.ly/4aXxvdZ>.



Source: Global Carbon Budget 2023 as presented on OurWorldInData.org. Retrieved from <https://bit.ly/3x0hTlJ> and <https://bit.ly/3VfSbYO>.

Global greenhouse gas emission pathways

Annual emissions in CO₂-equivalent gigatonnes



Source: Wikimedia. (2022). Greenhouse Gas Emissions Scenarios. Retrieved from <https://bit.ly/4bPq75q>. Data from Ritchie, H. & Roser, M. (2016). CO₂ and Greenhouse Gas Emissions. OurWorldInData.org. Updated data (2023) retrieved from <https://bit.ly/45ieOjl>.

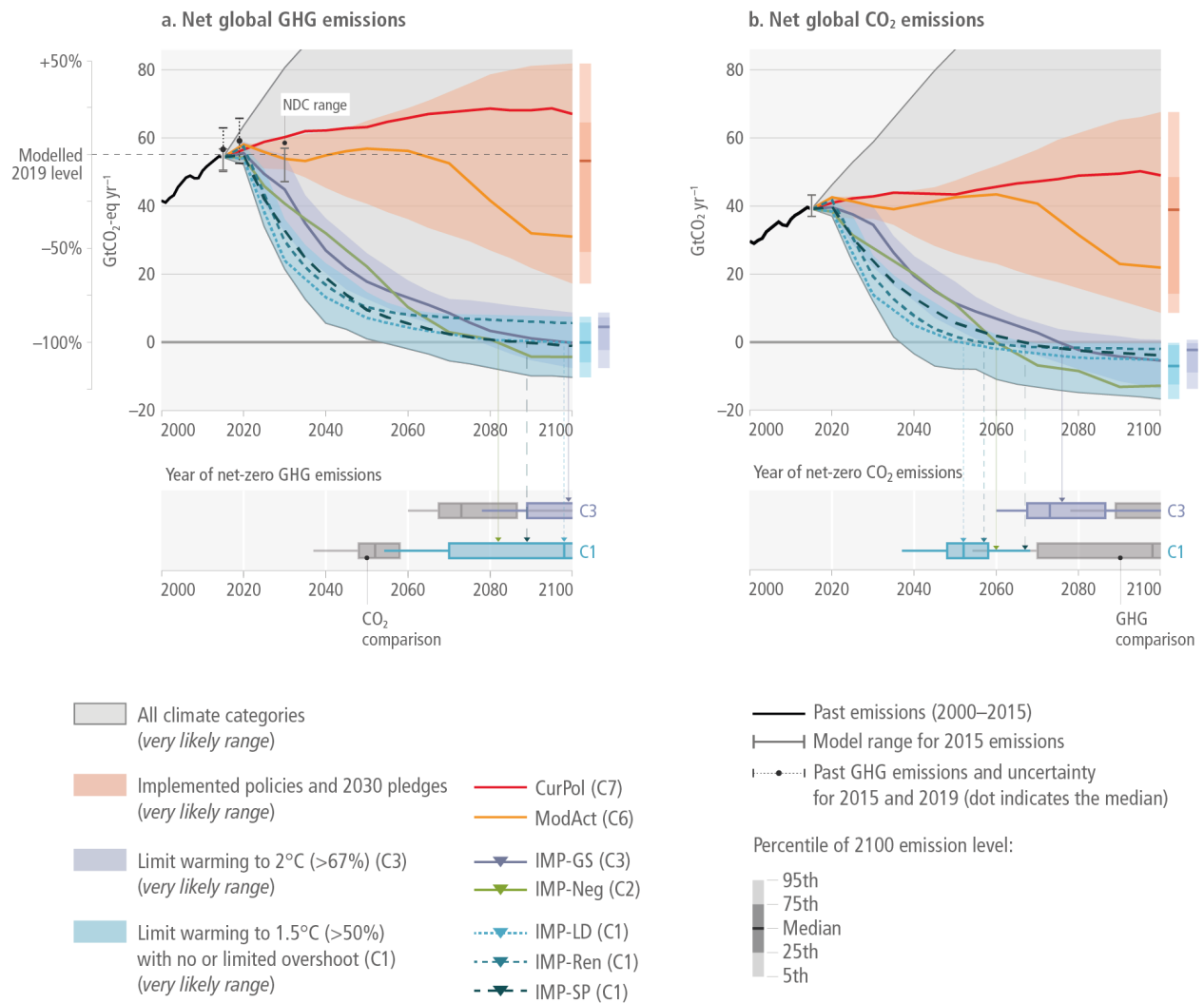
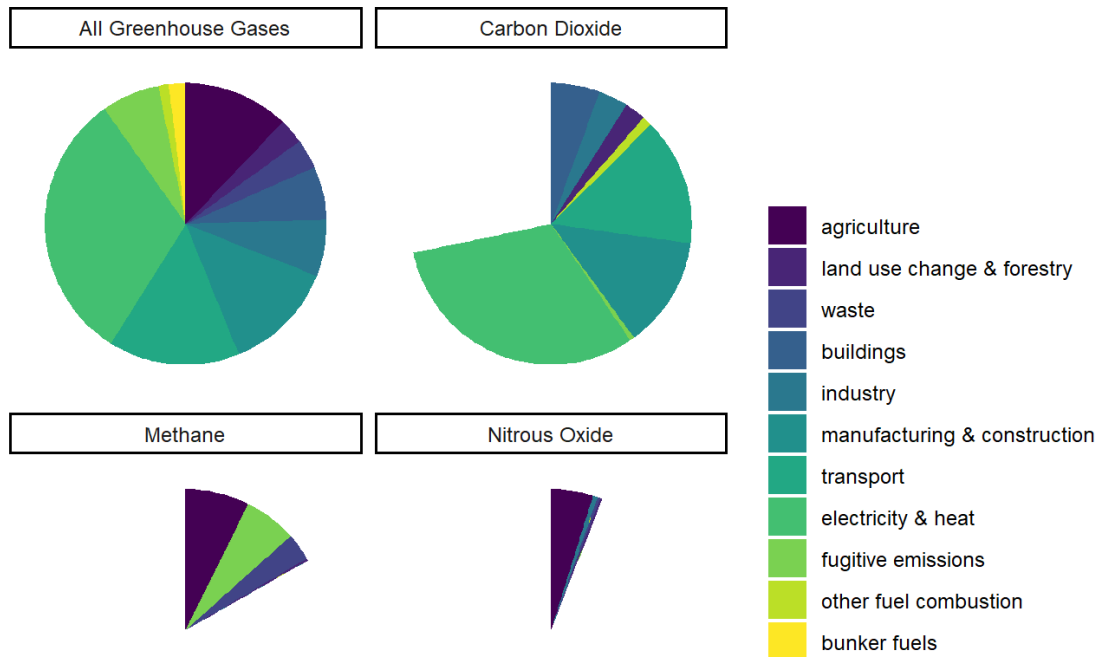


Figure 3.6 in Cooley, S., Schoeman, D., Bopp, L., Boyd, P., Donner, S., Ghebrehiwet, D.Y. ... & Skern-Mauritzen, M. (2022). Ocean and Coastal Ecosystems and their Services. In H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, ... & B. Rama (eds.), *Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (pp. 379-550). Cambridge University Press. doi:10.1017/9781009325844.005. Retrieved from <https://bit.ly/3Xdqh1Z>.



Source: Figure by authors based on data in Ritchie, H., Rosado, P., & Roser, M. (2020). Breakdown of carbon dioxide, methane and nitrous oxide emissions by sector. *OurWorldInData.org*. Retrieved from <https://bit.ly/4b0ZCJ4>.