

# ENERGY & CLIMATE WORKSHEET

Interactive worksheet series for 14-16 year olds produced by WAME  
Internet access needed to complete the worksheet



## THE CARBON CYCLE AND THE GREENHOUSE EFFECT

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Climate change, not weather change, is causing the world to get warmer. It will continue to get warmer as long as we continue to emit Green House Gasses (GHG) into the atmosphere. This warming has dramatic consequences for life on this planet including our oceans, weather, food production and our health.

The primary reason for the increase in GHGs over the last century is the increase in burning of fossil fuels for the production of electricity and heat in homes and in industry and for transportation of persons and goods in a globalised world. However, today over 11% of the world population does not have access to electricity which is a serious impediment to both human and economic development. The Sustainable Development Goal number 7 (SDG7) strives to provide energy access to all by 2030 while the Sustainable Development Goal number 13 (SDG13) strives to combat climate change. This worksheet explores how to make these two goals compatible.

# THE CARBON CYCLE AND THE GREENHOUSE EFFECT

## Origins of Green House Gasses

The amount of CO<sub>2</sub> produced by natural sources is offset by natural carbon sinks (absorption) and has been so for thousands of years. Before the influence of humans, carbon dioxide levels were quite steady because of this natural balance.

### ACTIVITY 1:

Watch the video "[The Carbon Cycle](#)" and complete the differentiated list below with human induced and naturally induced sources of GHG emissions as well as list the natural sinks that help with absorption of GHGs.

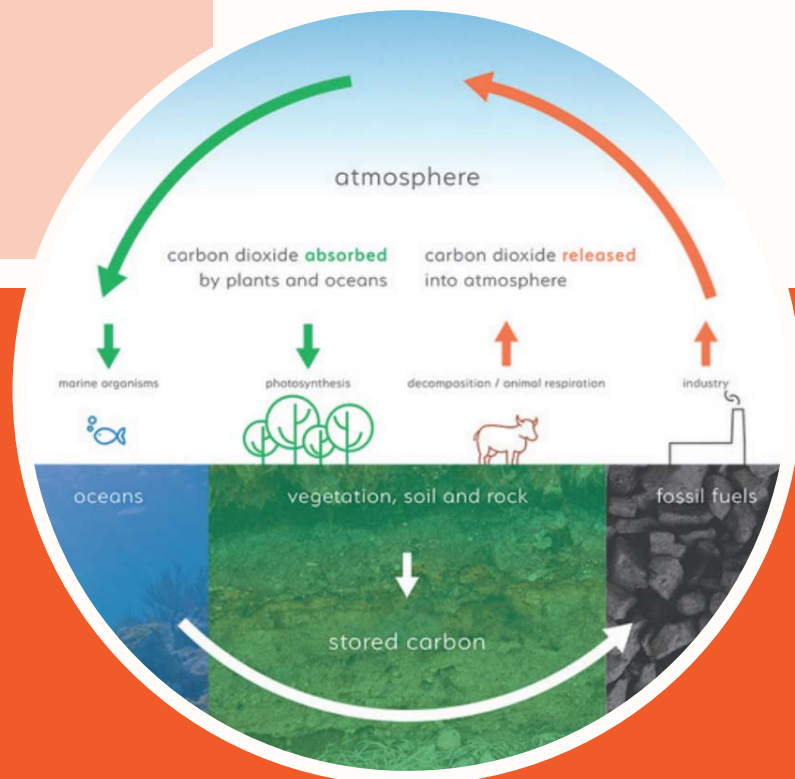
Naturally induced  
GHG  
(released)

Human induced  
GHG  
(released)

Natural GHG sinks  
(absorbed)

### Useful resources:

- [The Carbon Cycle video](#)
- Carbon Cycle image below



**“WE CANNOT SOLVE OUR  
PROBLEMS WITH THE SAME  
THINKING WE USED WHEN WE  
CREATED THEM.”**

**ALBERT EINSTEIN**

# MEASURING THE MAIN SOURCES OF GHG EMISSION

## Sources of Green House Gasses

Determining the exact amount of GHG emission and linking it to a specific source is a difficult task which many scientists have been working on for a long time and continue to work on today. It is important to know with detail where the emissions come from so that we can address the main sources of emissions properly.

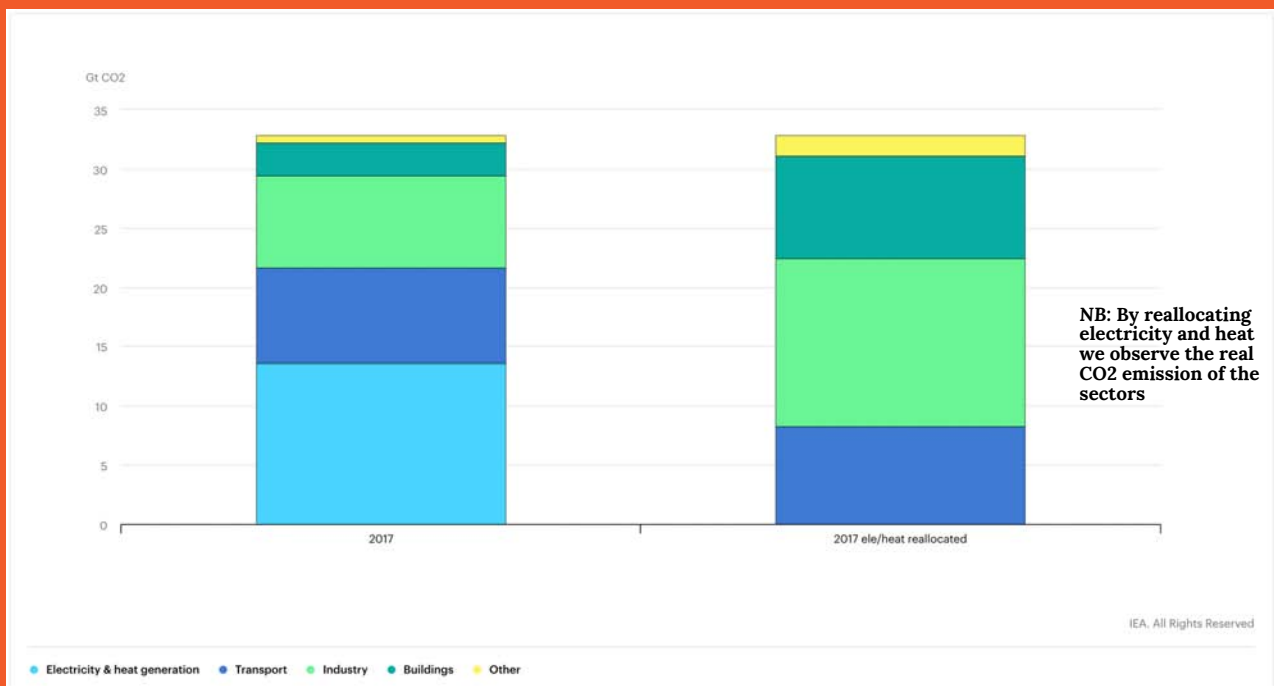
### ACTIVITY 2:

List the main sectors in the world that are the greatest emitters of CO<sub>2</sub> today. Identify which sub-categories of each sector you think contribute most to the given sector in your country (electricity & heat, transport, buildings, industry).

### Greatest GHG emission sectors today:

### Greatest GHG emission sub-sectors in your country:

## Global CO<sub>2</sub> emissions by sector, 2017



Useful resource: [Our World in Data](#) and specifically [CO<sub>2</sub> emission by sector and by country](#).

# THE CARBON CYCLE AND THE GREENHOUSE EFFECT

## Origins of Green House Gasses

*The industrial revolution has given humanity an unprecedented quality of life and has doubled life expectancy in many places.*

*But all these advances have come with a global cost that we are only truly acknowledging today, that of increased GHG emissions and climate change. Who is to blame? Should we stop human development? How do we curb emissions in the future?*

### ACTIVITY 3:

**Complete the tables below, compare the annual emissions of selected countries regarding 1. total annual emissions and 2. emissions per annum per capita in 1910, 1950, 1990, 2016.**

#### Useful resources:

- [Annual CO2 emission 1751 – 2016](#)
- [CO2 emissions per capita 1800-2016](#)

Identify the total annual emissions of each country/region using this link:  
[Annual CO2 emission 1751 – 2016](#)

	1910	1950	1990	2016
<b>China</b>				
<b>India</b>				
<b>Italy</b>				
<b>EU28</b>				
<b>USA</b>				

Identify the total annual emission per capita of each country using this link:  
[CO2 emissions per capita 1800-2016](#)

	1910	1950	1990	2016
<b>China</b>				
<b>India</b>				
<b>Italy</b>				
<b>UK</b>				
<b>USA</b>				

What accounts for the differences you obtain in the two tables? Which are the two nations that emits most CO<sub>2</sub>? Explain briefly below:

If we decided that all nations would have to contribute to a "climate fund" equivalent to the CO<sub>2</sub> they have emitted so far, which countries would end up paying most to the fund? Explain briefly below:

What solutions do you think will contribute to solving climate change? Explain briefly below:

# THE SDG7 AND SDG13 NEXUS CHALLENGE

*Providing access to energy for all in a sustainable way*

*Currently, over 11% of the world population have no access to electricity. The world distribution of this energy poverty largely coincides with the world distribution of overall extreme poverty. To “Ensure access to affordable, reliable, sustainable and modern energy for all” (SDG7) is a big challenge in itself, but even a bigger challenge as we must make sure it does not lead to increased GHG emission (SDG13).*

## ACTIVITY 3:

**Use the resources below and answer the questions.**

### **Useful resources:**

- [Rural electrification in Mozambique](#)
- [World Electrification Rate](#)
- [Providing light to Rural villages in Senegal](#)

**What are the main benefits of providing access to energy to rural communities ? Explain briefly below:**

**How can the provision of energy (SDG7) go hand in hand with the protection of our planet (SDG13)? Explain briefly below:**