# HS 232

Lecture 10 29th January 2025

Production and consumption aspects to climate change

Source of maps :

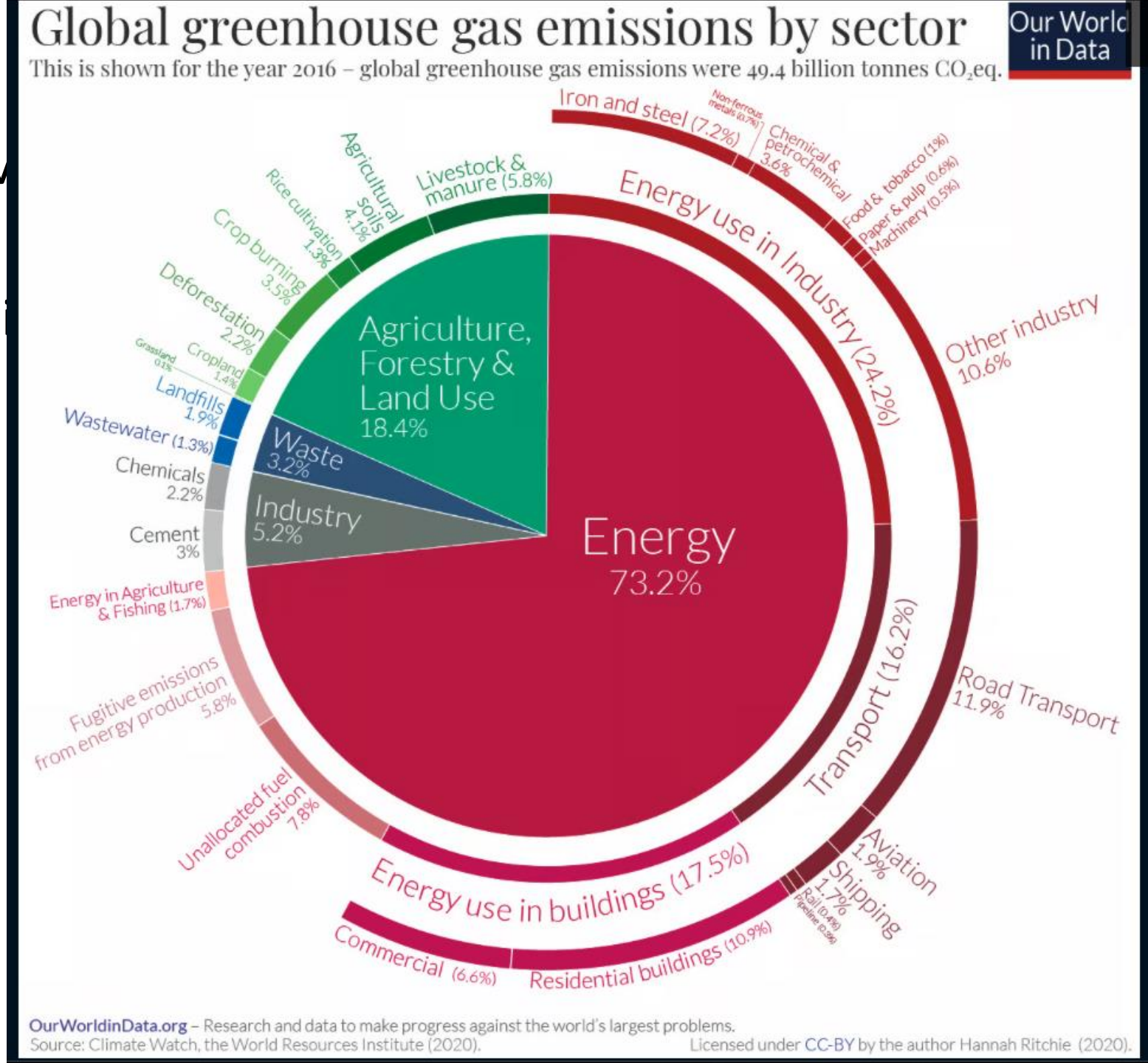
https://ourworldindata.org

# Recap

- Mitigation as public good
- Climate change as public bad
- Market failure – under production / over production
- Policy options to correct the marker failure
- Carbon Tax
- Cap and Trade
- Elastic and inelastic demand
- Case of India

# GHG emission inv

- A greenhouse gas (GHG) i
  the associated emissions



# Why is a GHG inventory important?

- GHG inventories help organizations manage GHG risks and identify opportunities for reduction
- GHG inventories can be used to compare emissions across organizations, sectors, and countries

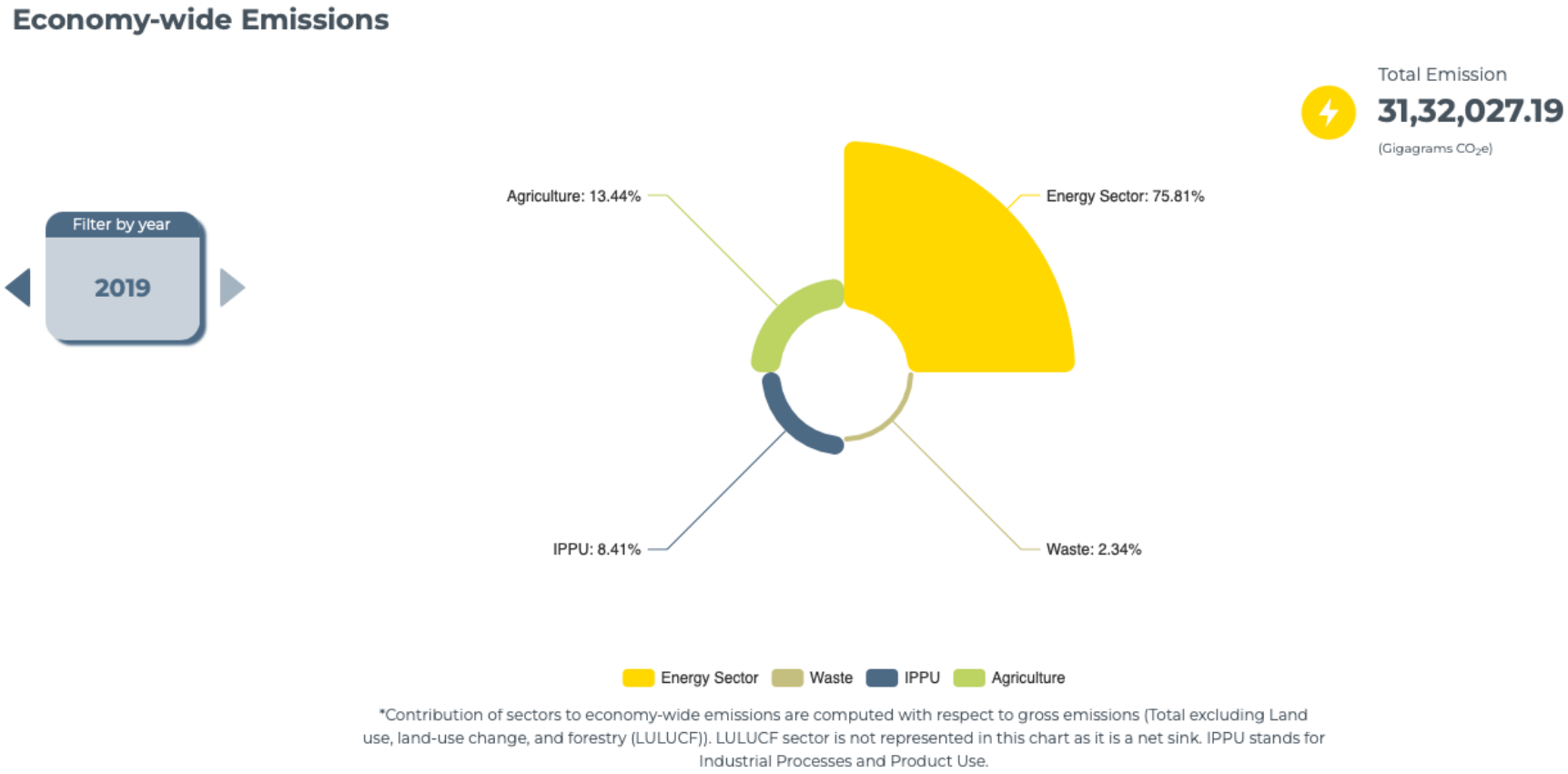
How is a GHG inventory created?

- **Define boundaries**: Determine the boundaries and emissions sources within those boundaries
- **Collect data**: Collect data for the defined period
- **Quantify emissions**: Calculate the emissions

# Role of GHG inventory in COP

- A Greenhouse Gas (GHG) inventory plays a crucial role in COP (Conference of the Parties) discussions by providing the essential data needed to assess each country's emissions levels, track progress towards climate change mitigation goals, and inform policy decisions regarding emission reduction targets and international climate agreements, essentially acting as the foundation for transparent accountability in climate action on a global scale.

# Niti Aayog website (https://iced.niti.gov.in/climate-and-environment/ghg-emissions/economy-wide)




IPPU – Industrial Processes and Product Use

# Carbon footprint

- A **carbon footprint** is the total amount of greenhouse gases (GHGs), primarily carbon dioxide ($CO_2$), released into the atmosphere as a result of an individual's, organization's, product's, or activity's actions. It is usually measured in units of **carbon dioxide equivalents ($CO_2e$)** to account for different types of GHGs (e.g., methane, nitrous oxide) and their global warming potential.
- A carbon footprint is essentially a **subset** of a GHG inventory. It focuses on the emissions associated with specific activities, while a GHG inventory considers emissions from all sources and sinks within a system.
- A **carbon footprint** helps individuals or organizations identify and reduce emissions in targeted areas (e.g., product design or energy efficiency).
- A **GHG inventory** is typically used for broader strategic planning, tracking national commitments, or regulatory reporting (e.g., Nationally Determined Contributions or corporate sustainability goals).

# Nationally Determined Contributions

- **Nationally Determined Contributions (NDCs)** are country-specific action plans that outline a nation's efforts to address climate change under the **Paris Agreement**
- **Key Features of NDCs:**
- **Country-Driven**:
  Each country decides its own climate goals based on its national circumstances, development priorities, and capabilities. These goals are "nationally determined," reflecting the principle of **common but differentiated responsibilities** under the Paris Agreement.
- **Targets and Actions**:
  - NDCs include specific **mitigation** targets, such as reducing greenhouse gas (GHG) emissions by a certain percentage compared to a baseline year or achieving carbon neutrality by a specified date.
  - Many NDCs also incorporate **adaptation** measures, which describe how the country plans to build resilience to the impacts of climate change.

- **Transparency and Reporting**:
  Countries are required to report on their progress toward meeting their NDC goals through periodic submissions called **Biennial Transparency Reports**.
- **Ambition Cycle**:
  NDCs are revised and updated every five years to reflect increased ambition over time, known as the **ratchet mechanism**. This ensures that global climate action strengthens progressively.
- **Means of Implementation**:
  Plans for accessing **financial resources**, technology transfer, and capacity-building support, particularly for developing nations.

**NDCs Depend on GHG Inventories for Target-Setting**

# Examples of NDC Commitments:

- **India**:
  - Achieve 50% of installed electricity capacity from non-fossil fuel-based energy sources by 2030.
  - Reduce the emissions intensity of its GDP by 45% by 2030 compared to 2005 levels.
- **European Union**:
  - Cut net GHG emissions by at least 55% by 2030 compared to 1990 levels.

# Production based emission

- **Production-based emissions** refer to the greenhouse gas (GHG) emissions generated within a country's territorial boundaries or jurisdiction from the production of goods and services. These emissions are accounted for in the place where the economic activity producing them occurs, regardless of where the goods or services are eventually consumed.
- If a factory in **India** produces textiles for export to **Europe**, the emissions from that factory (e.g., energy use, industrial processes) are counted as part of **India's production-based emissions**, even though the textiles are consumed in Europe.

# Consumption-based emissions

- **Consumption-based emissions** refer to the greenhouse gas (GHG) emissions associated with the production of goods and services consumed within a country, regardless of where those goods and services were produced. This method attributes emissions to the end consumer, rather than the producer.
- If a smartphone is manufactured in **China** and consumed in **the United States**, the emissions from its production (e.g., raw material extraction, assembly) are attributed to the **United States** under consumption-based emissions accounting, even though the production occurred in China.

# Fairness in Climate Policy:

- Provides a clearer picture of a country's true environmental impact, especially for developed nations that outsource production to developing countries.
- Currently, under the Paris agreement, carbon emissions targets are based on production- based accounting.
- This approach alone is rather unfair because it means that richer countries can reduce their carbon emissions without reducing carbon consumption.
- For example, although the UK has been deindustrializing within its own national borders it has increased the amount of food it imports from overseas, leading to the offshoring of emissions.

- Consumption-based emissions equals production-based emissions, *minus* emissions embedded in exports, *plus* emissions embedded in imports.
- If a country's consumption-based emissions are higher than its production emissions it is a net importer of carbon dioxide. If its consumption-based emissions are lower, then it is a net exporter.
- Emissions from international aviation and shipping are not included in any country or region's emissions. They are only included in the global total emissions.
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# Consumption-based $CO_2$ emissions

Consumption-based emissions include those from fossil fuels and industry. Land-use change emissions are not included.

Our World in Data

Table | Map | Chart

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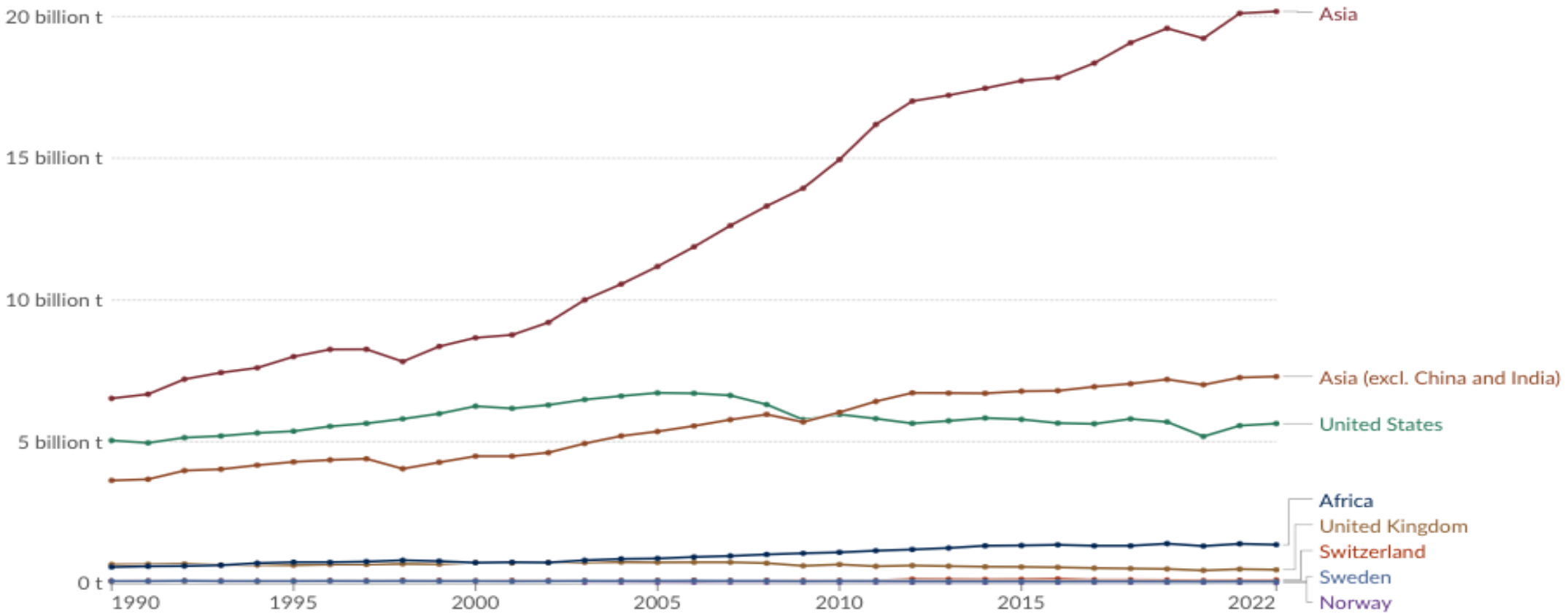


Play time-lapse 1990 2022

# Per capita consumption-based $CO_2$ emissions

Our World in Data

Consumption-based emissions are national emissions that have been adjusted for trade. It's production-based emissions minus emissions embedded in exports, plus emissions embedded in imports.

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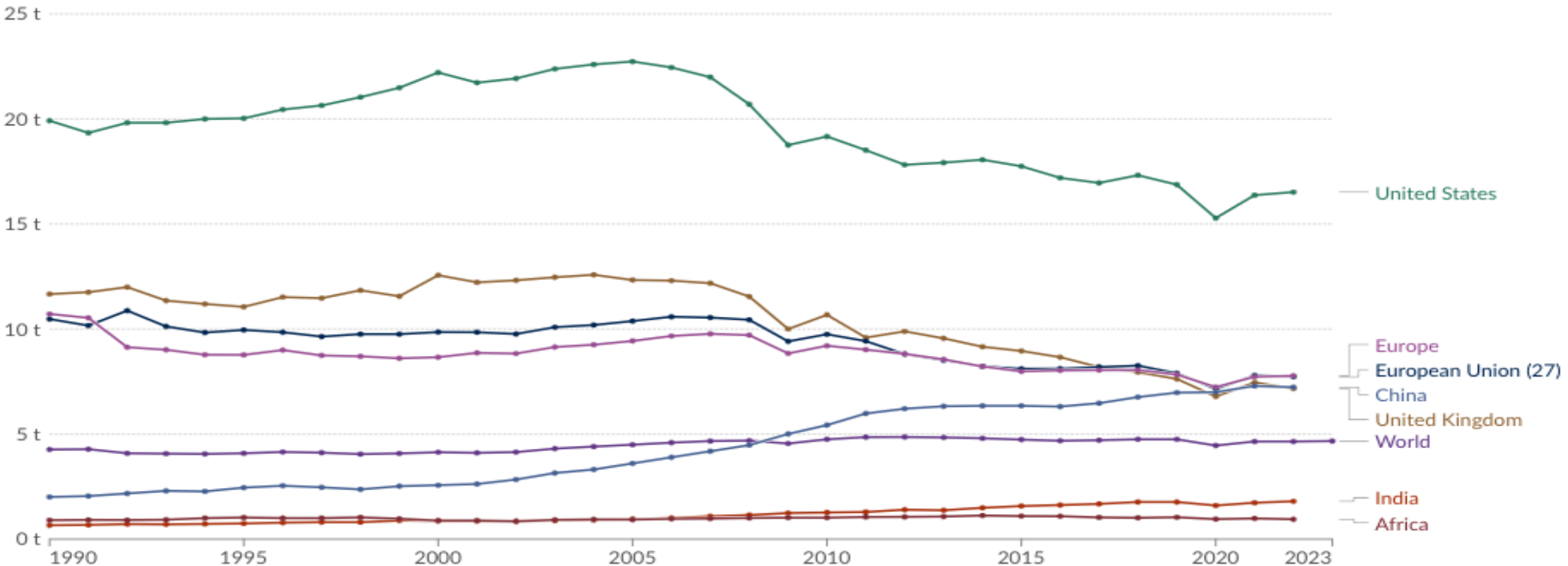


Play time-lapse 1990 2023

**Data source:** Global Carbon Budget (2024); Population based on various sources (2024) – Learn more about this data

OurWorldinData.org/co2-and-greenhouse-gas-emissions | CC BY

# Share of $CO_2$ emissions embedded in trade

Exported or imported emissions as a percentage of domestic production emissions. Positive values (red) represent net importers of $CO_2$. Negative values (blue) represent net exporters of $CO_2$.

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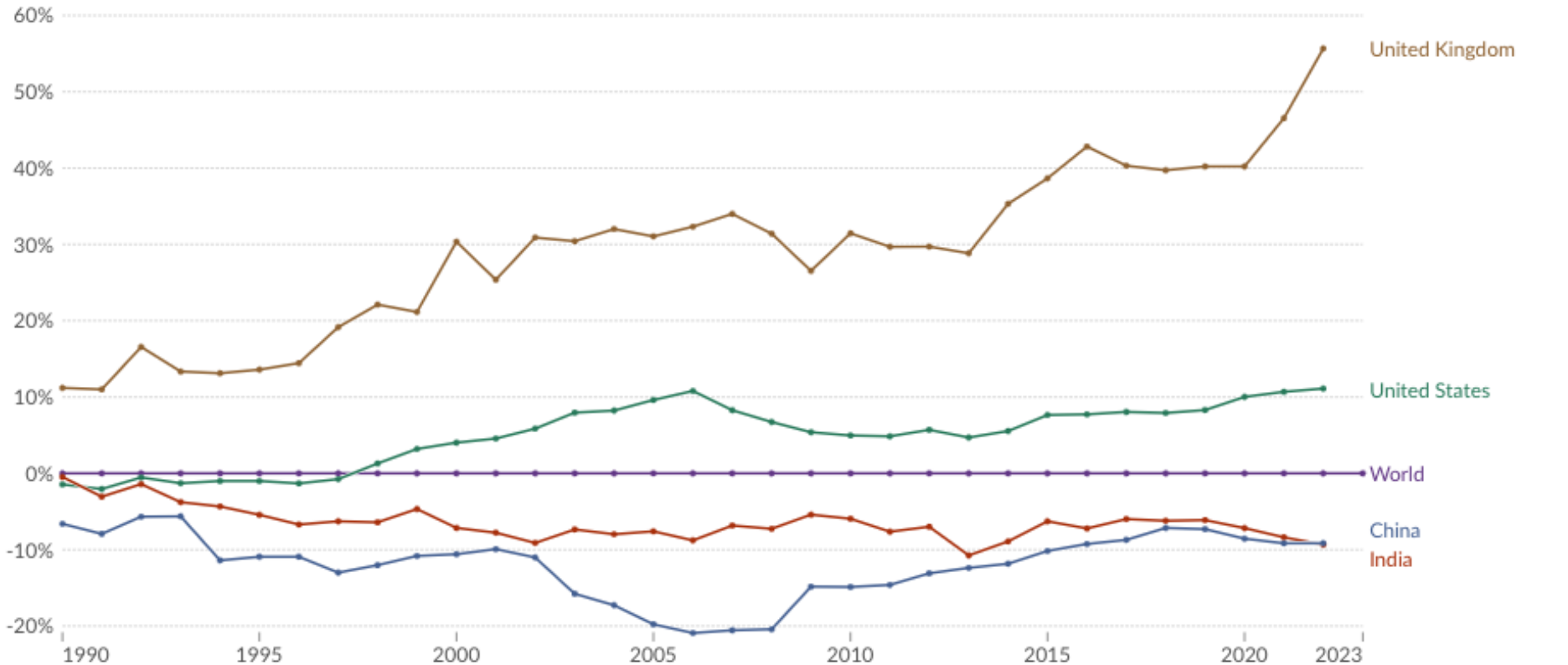


Play time-lapse 1990 2023

# Consumption-based carbon intensity

Carbon intensity measures the kilograms of $CO_2$ emitted per unit of GDP. Consumption-based emissions include those from fossil fuels and industry. Land-use change emissions are not included.

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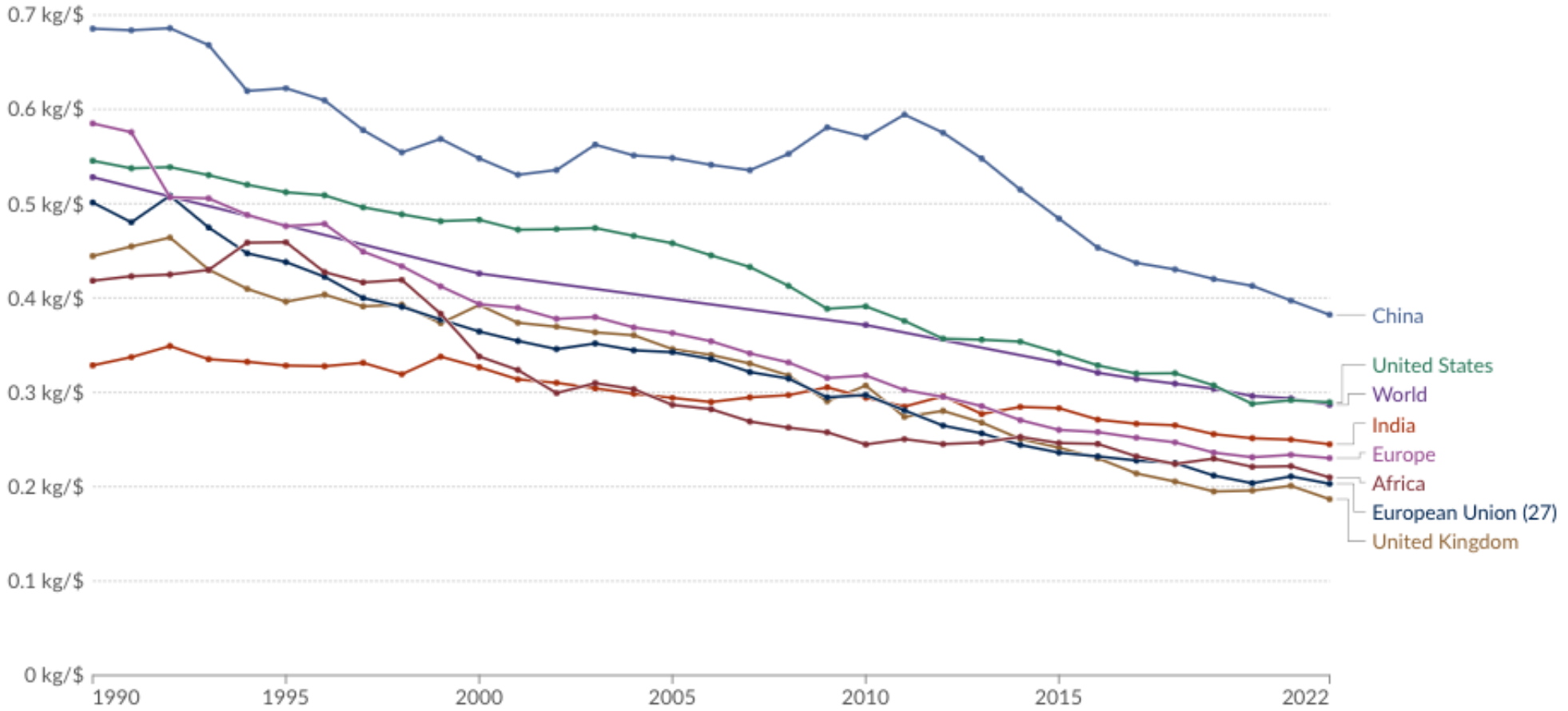


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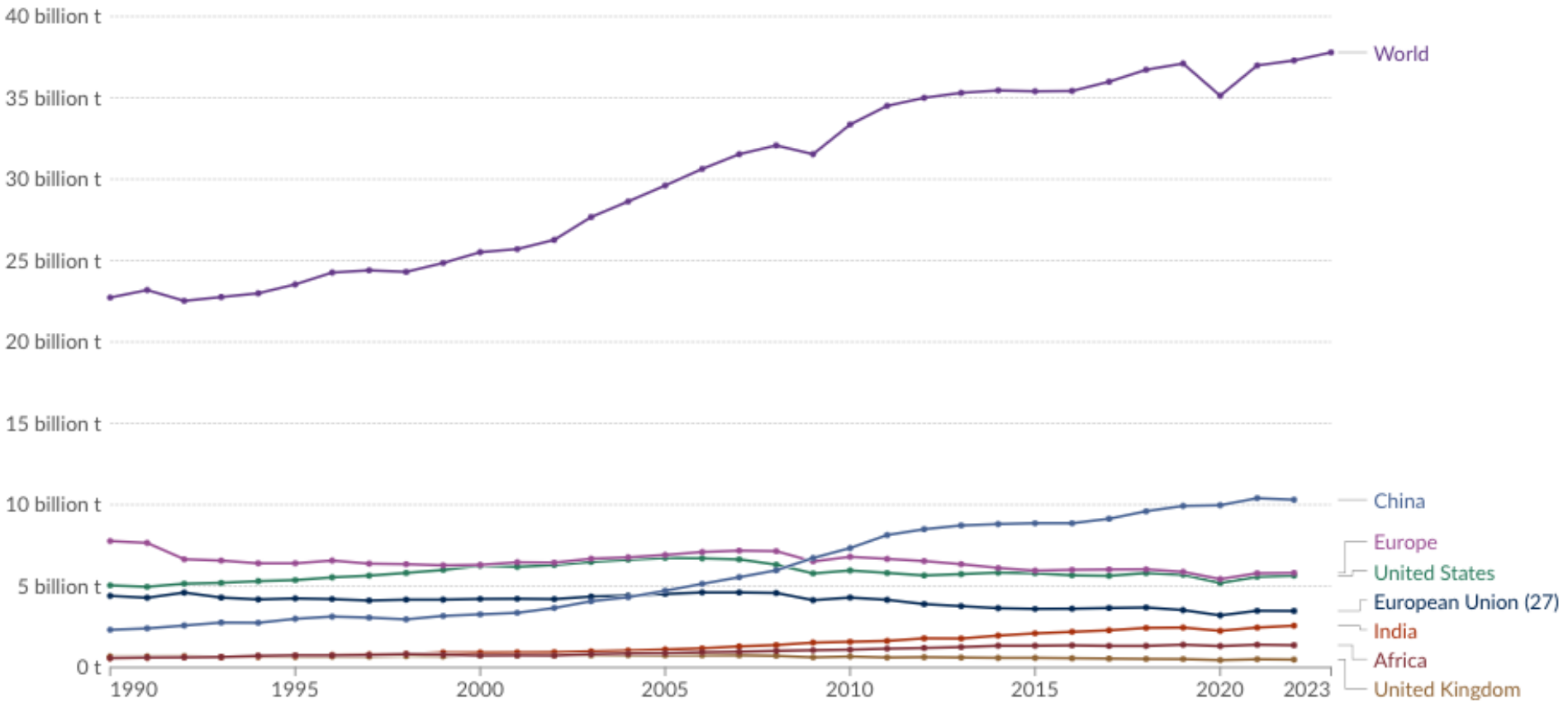


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