



# VERIFY:

## Observation-based system for monitoring and verification of greenhouse gases

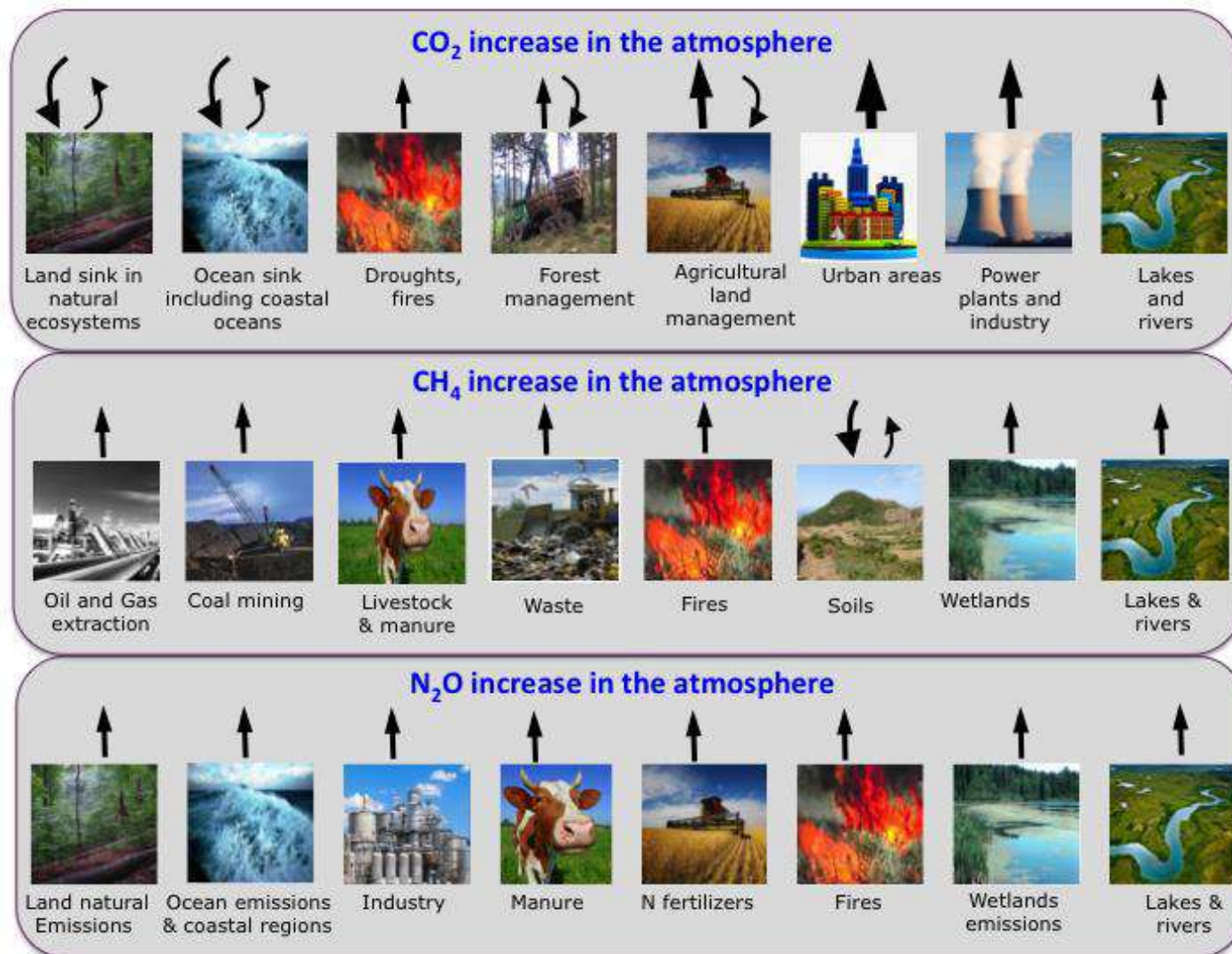
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- Consortium of 40 institutes and inventory agencies
- Budget of 10 M€ ; Period: 4 years (2018 – 2022)
- Designed to :
  - **Advance the methods** for quantifying GHG emissions and sinks
  - Facilitate the development of a GHG verification system for **practical use for policy and societal stakeholders.**

## Focus on

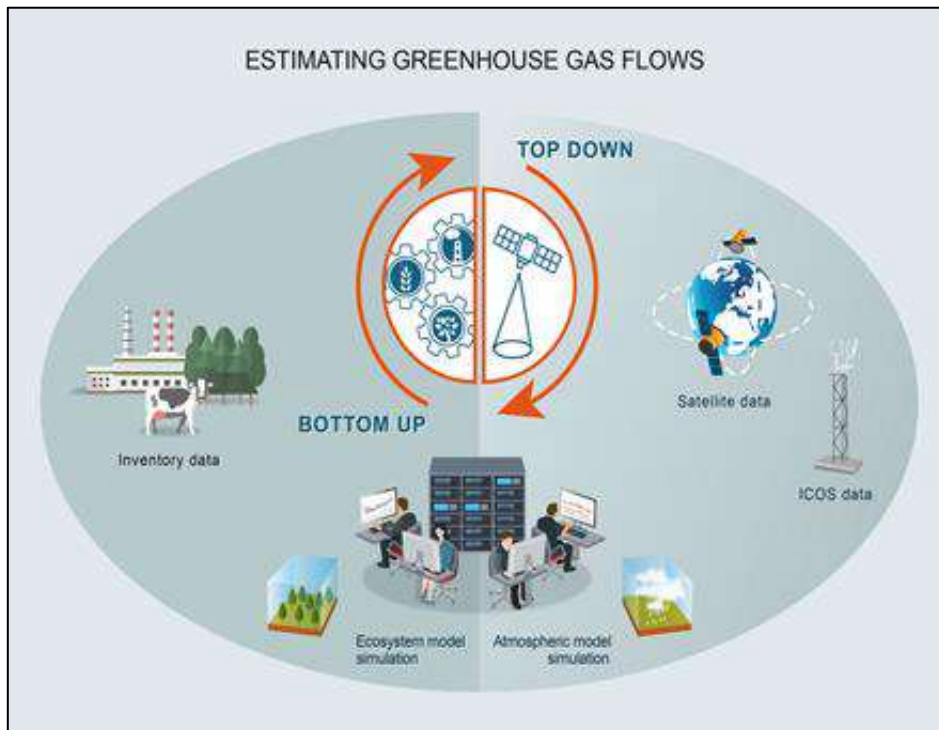
3 GHG

- CO<sub>2</sub>
- CH<sub>4</sub>
- N<sub>2</sub>O



Sources and sinks caused by different processes are **highly variable in space & time**

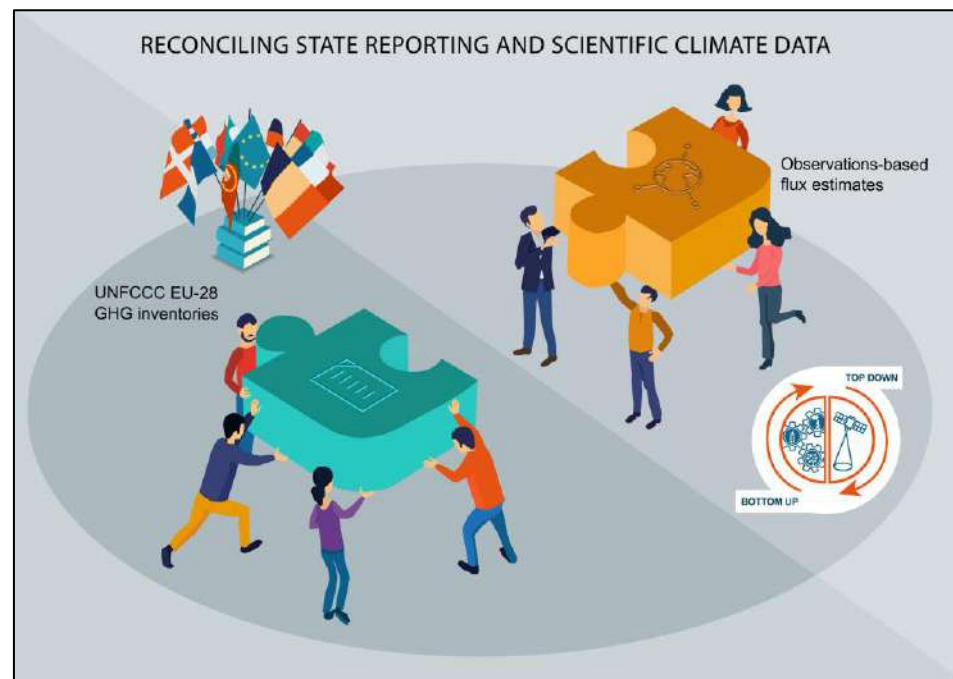
## ESTIMATING GREENHOUSE GAS FLOWS



1) Estimate CO<sub>2</sub> - CH<sub>4</sub> - N<sub>2</sub>O GHG fluxes at European country scales from bottom up / top down observation-based approaches

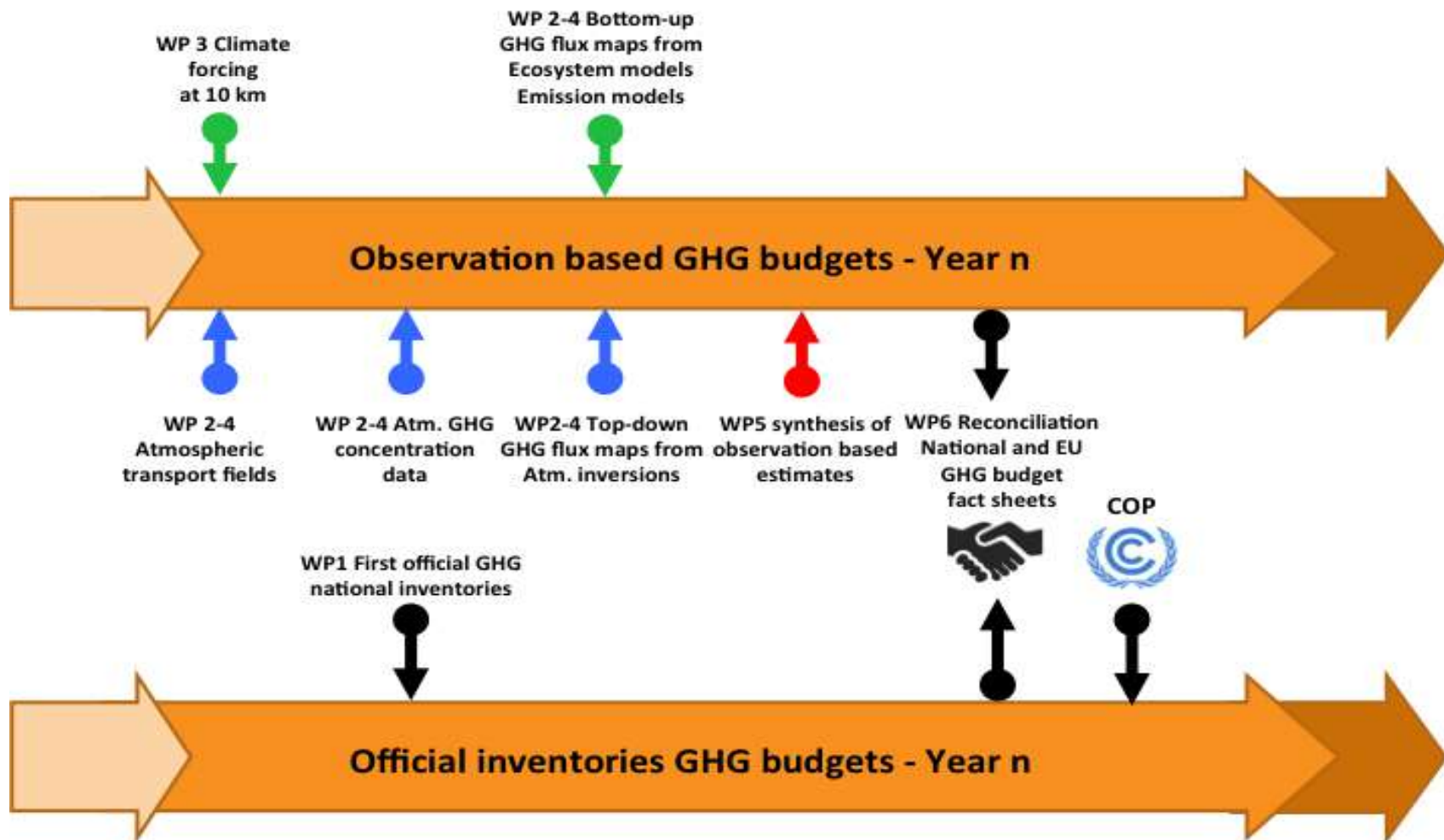


## RECONCILING STATE REPORTING AND SCIENTIFIC CLIMATE DATA



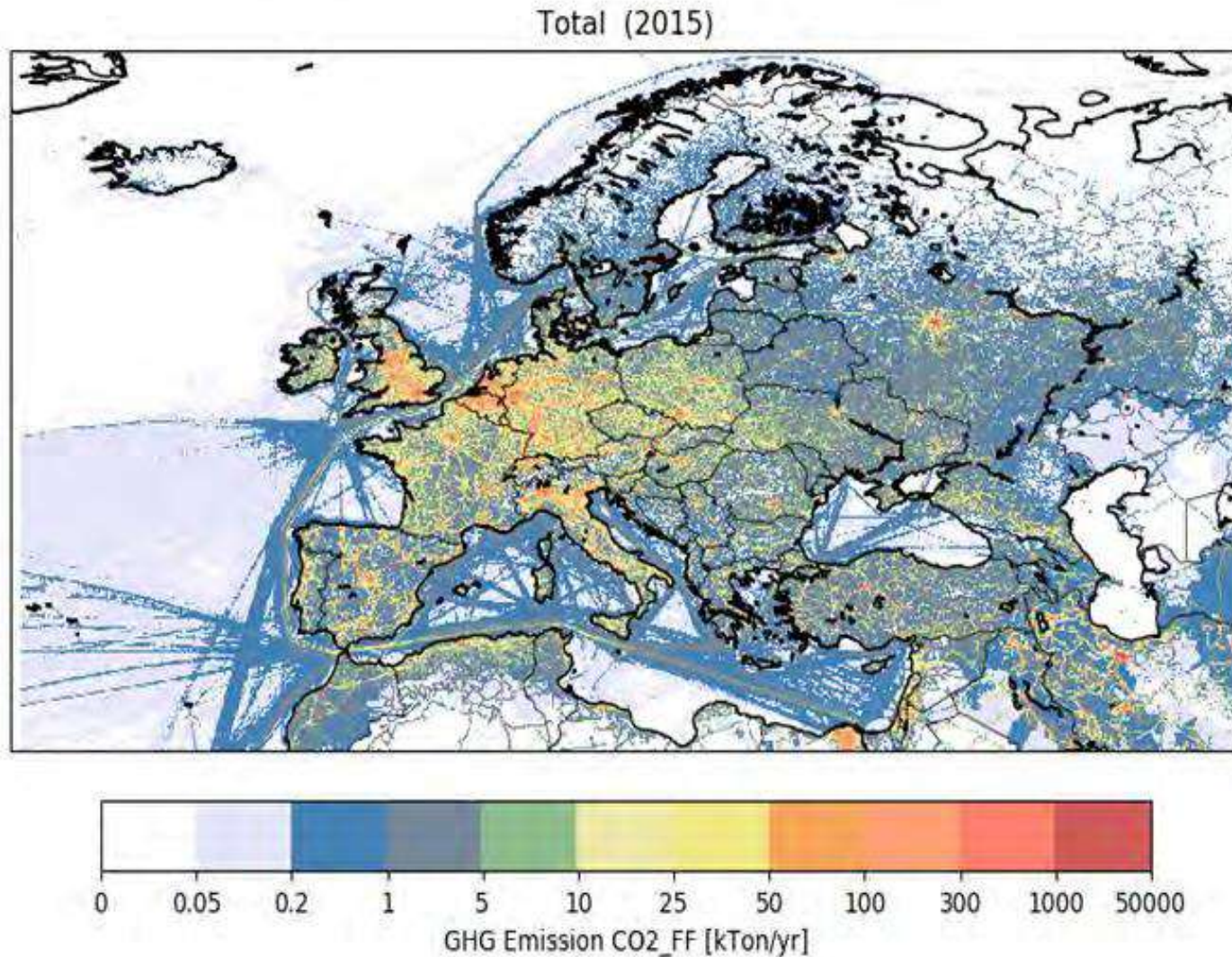
2) Compare observation-based estimates with the reported fluxes by each country to UNFCCC





- **Annual updates** of measurement-based GHG national budgets and inventories
- Regional changes in GHG budgets and drivers and uncertainties analysis
- Tracking progress towards EU mitigation targets (Paris Agreement NDCs, stocktake)

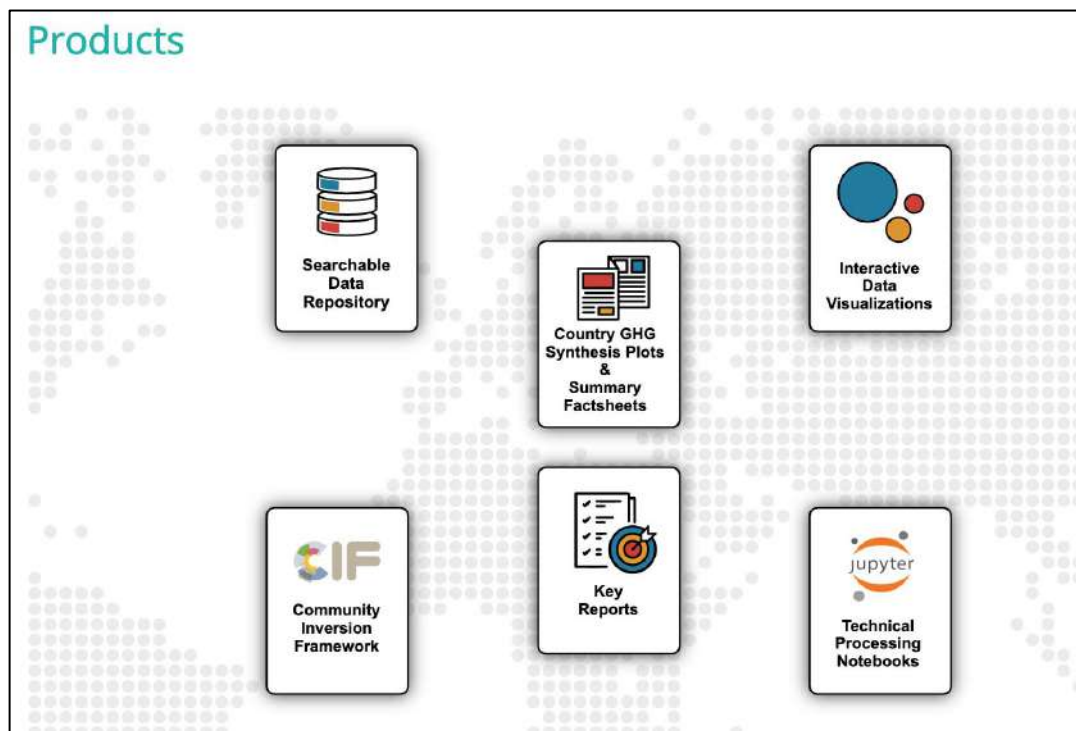
## High resolution fossil fuel emission maps



From the VERIFY web page:

<http://verify.lsce.ipsl.fr/index.php/products>

(Free registration)



- Data base with access to all gridded products
- Synthetic plots: GHG time evolution per country, including all estimates
- Key reports and factsheets
- Interactive visualisation tool



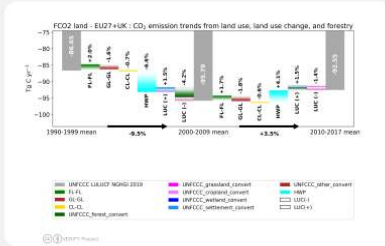
## Fact Sheet - E28 November 2020

# CO<sub>2</sub>land

E28 = EU27 + UK

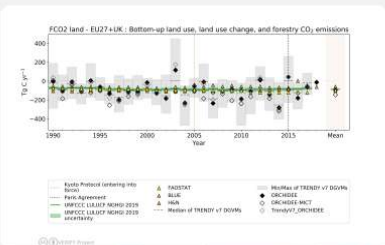


E28: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom

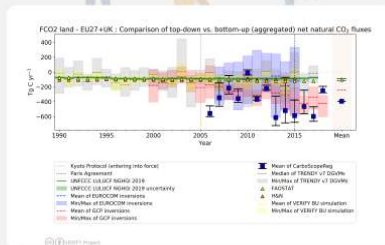


Summary of decennial trends from data reported to the UNFCCC

Carbon dioxide emissions reported to the UNFCCC from the land use, land use change, and forestry sector are a **strong sink** over the past three decades, with variation resulting primarily from harvested wood products.



Comparison between bottom-up approaches



Comparison between top-down and bottom-up approaches

Top-down and bottom-up scientific research models **agree** that the sector is a strong sink of atmospheric CO<sub>2</sub>, showing much greater year-to-year variability than NGHGs due to **heighted response to climatic variation**.



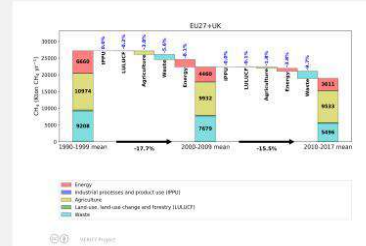
## Fact Sheet - E28 November 2020

# CH<sub>4</sub>

E28 = EU27 + UK

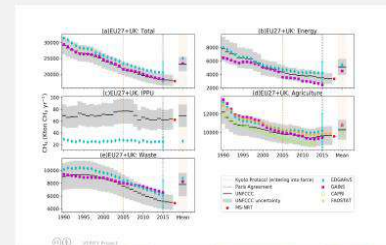


E28: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom

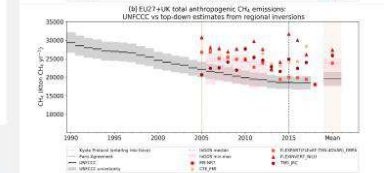
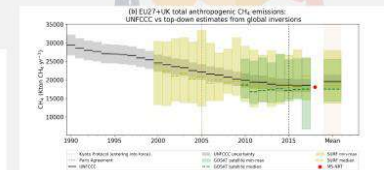


Summary of decennial trends from data reported to the UNFCCC

Methane emissions reported to the UNFCCC show a **significant reduction** over the past three decades, with reductions occurring primarily in the **waste sector** supported by smaller reductions in energy and agriculture.



Temporal evolution of sectoral emissions



Comparison between top-down and bottom-up approaches

Top-down and bottom-up scientific research models **agree** that the sector is a strong sink of atmospheric CO<sub>2</sub>, showing much greater year-to-year variability than national greenhouse gas emissions inventories due to **heighted response to climatic variation**.