

# The European Commission's science and knowledge service

Joint Research Centre



# Le emissioni di gas serra in Europa dati, tendenze e prospettive

**Elisabetta VIGNATI**

Head of Air and Climate Unit

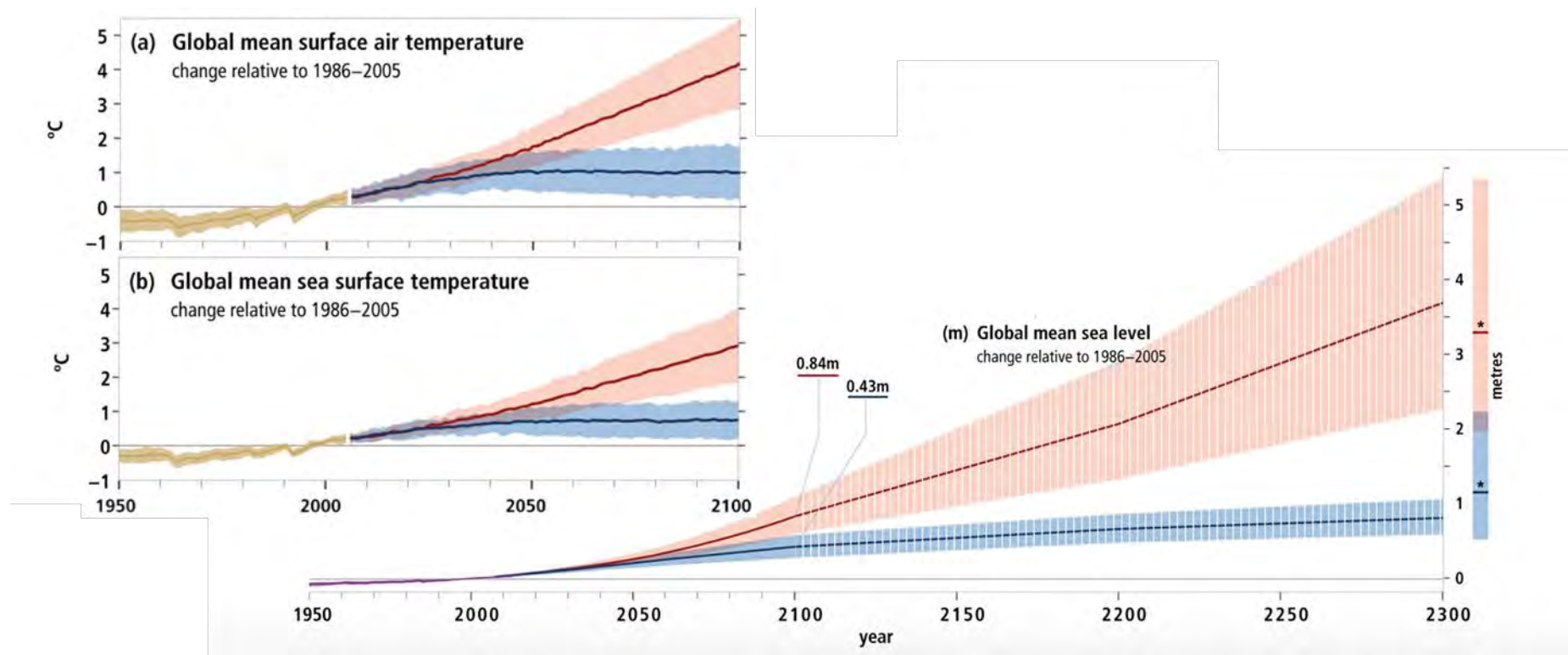
Directorate for Energy, Transport and Climate

Rete delle Università per uno sviluppo Sostenibile, – 22/11/2019

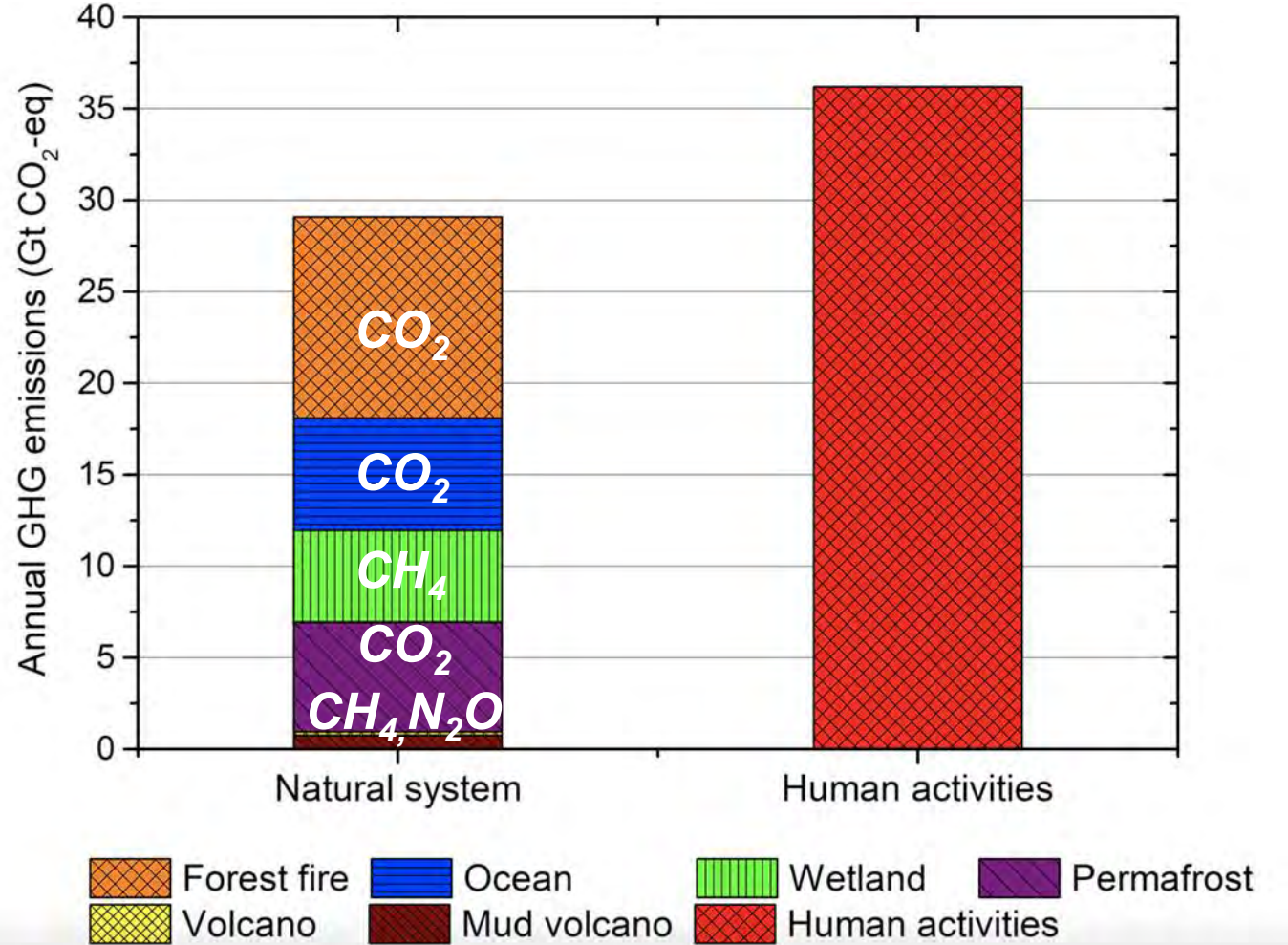
# 'Scelte fatte ora saranno critiche per il futuro...'

*riscaldamento climatico di 1 grado su livelli pre-industriali*

Historical (observed)    Historical (modelled)    Projected (RCP2.6)    Projected (RCP8.5)



# GHG: emissioni naturali e umane





# Sorgenti di GHG di origine antropogenica

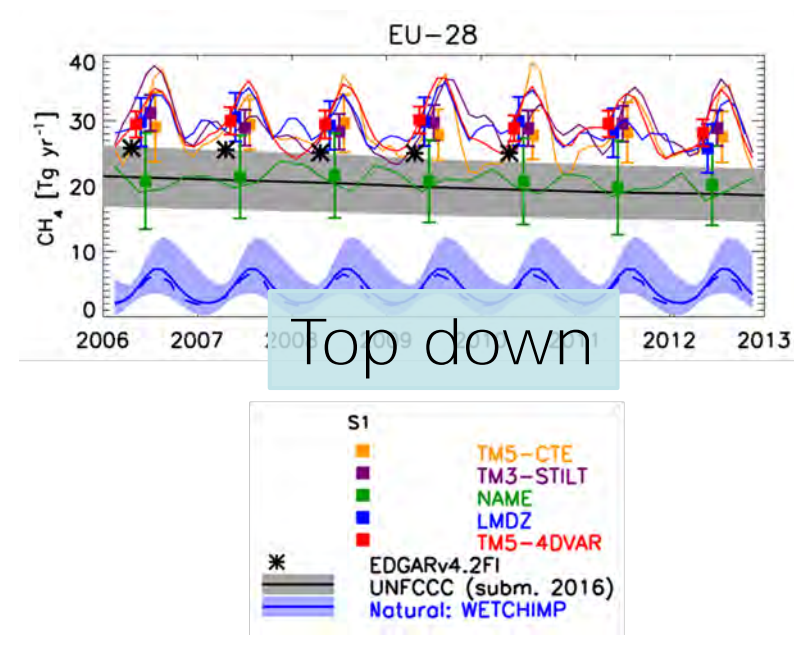
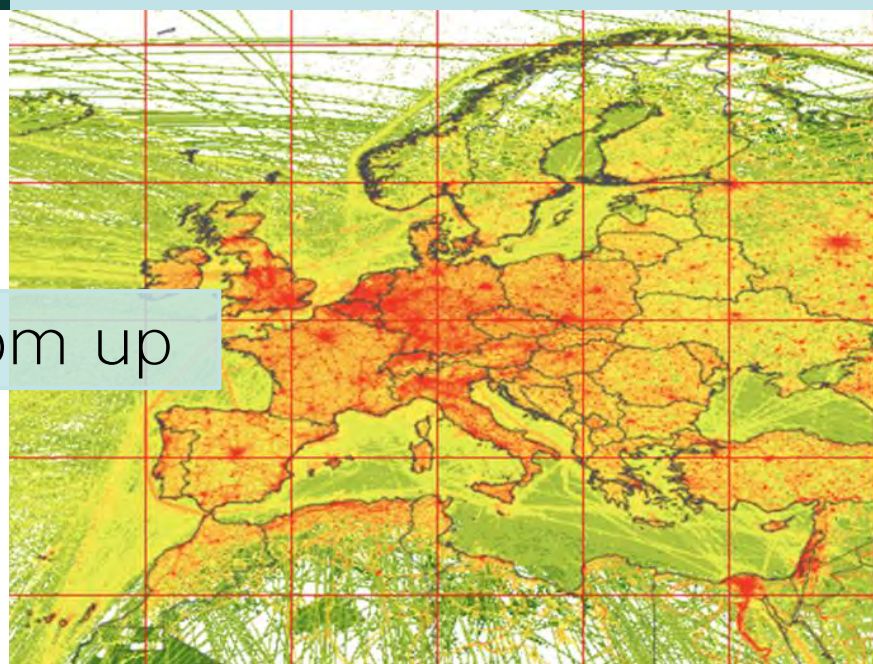
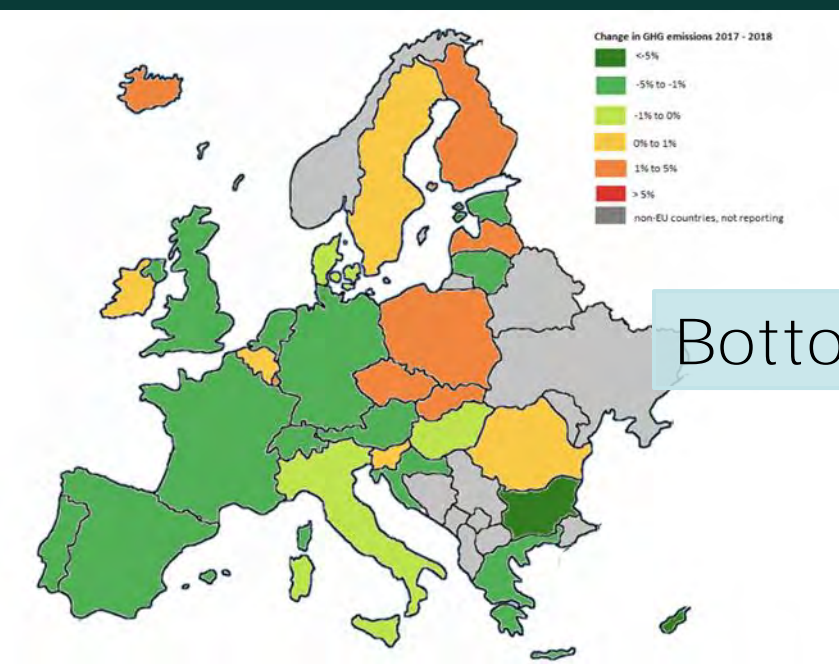




**Emissioni nazionali  
sottomesse a UNFCCC**

**Compile a partire da  
statistiche internazionali**

**Calcolate con inverse  
modelling a partire da  
misure in-situ e da  
satellite**



**EEA, rep. 16/2019**



**Bergamaschi et al, ACP, 2018**



### Periodi coperti:

- 1970 – 2015/2018
- Scenari (CIRCE/PEGASOS)



### Sorgenti antrop. tutte:

- no risospensione
- no LULUCF
- no incendi foreste/savane



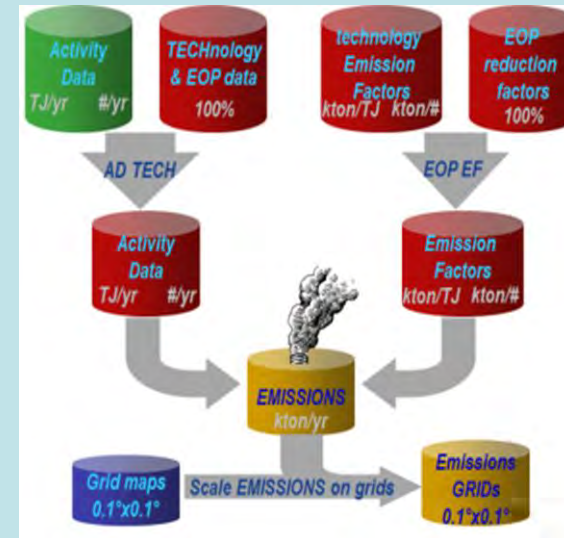
### Sostanze:

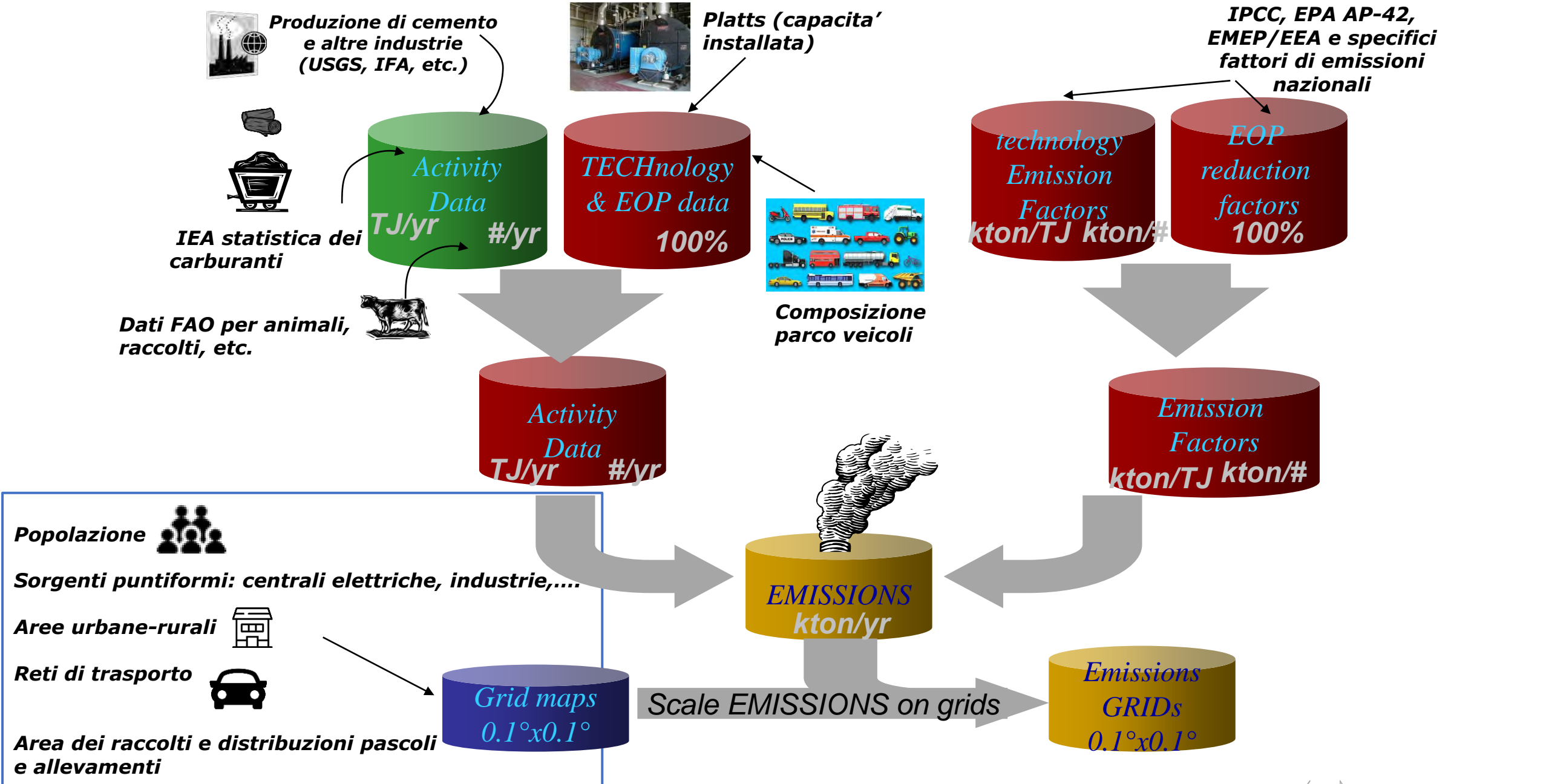
- CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, F-gases
- CO NO<sub>x</sub> VOC NH<sub>3</sub> SO<sub>2</sub>
- PM OC BC Hg



### Gridmaps:

- globali 0.1°x 0.1°
- zoom a 700m





$$EM_C(t, x_l) = \sum_{i,j,k} [AD_{C,i}(t) * TECH_{C,i,j}(t) * EOP_{C,i,j,k}(t) * EF_{C,i,j}(t, x_l) * (1 - RED_{C,i,j,k}(t, x_l)) * f_{C,i,j}(x_l)]$$

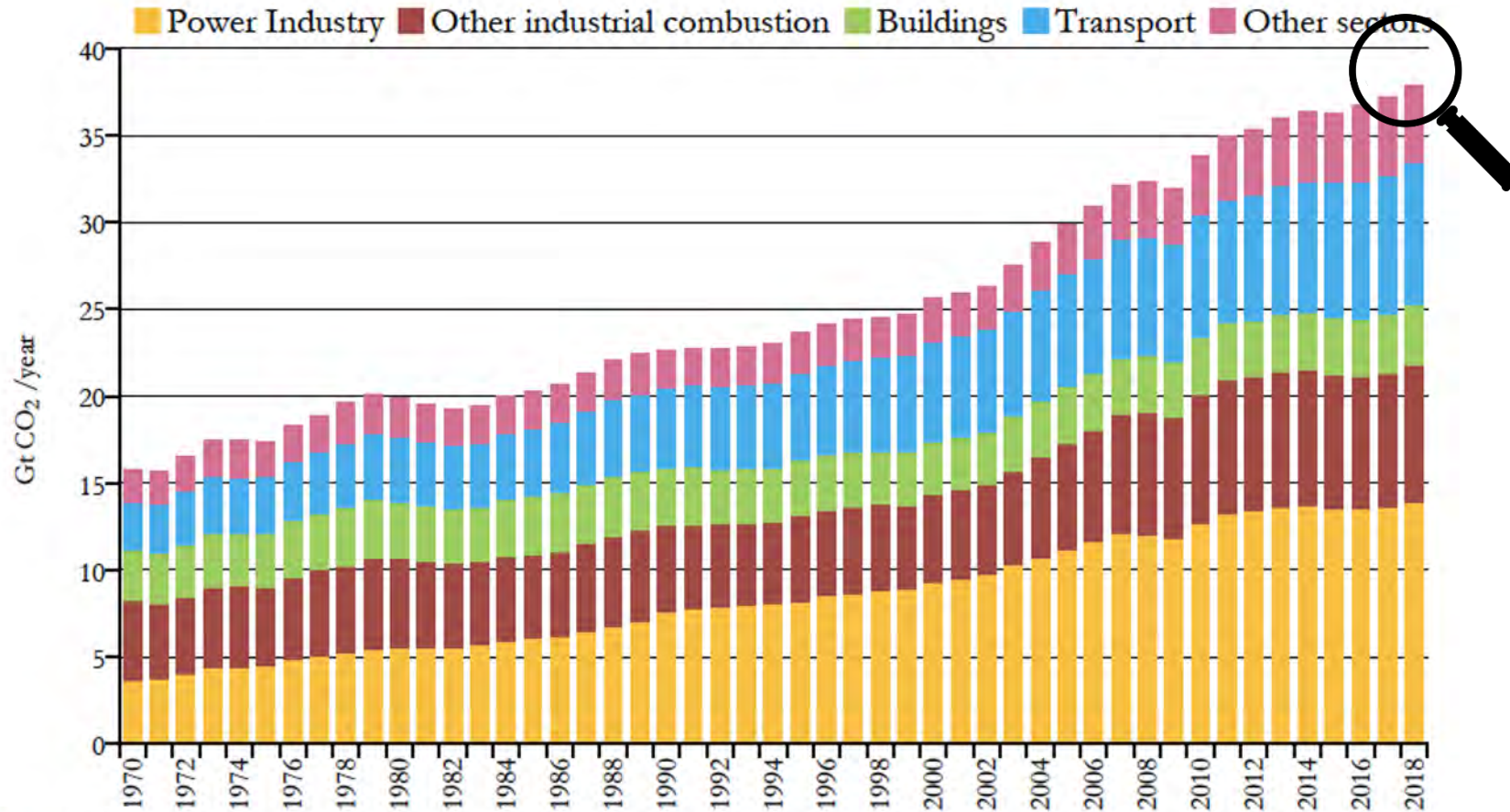


# Uno sguardo globale $CO_2$



# Emissioni di CO<sub>2</sub>

## andamenti per i settori principali



**+ 1.9%**  
**2017 vs 2018**

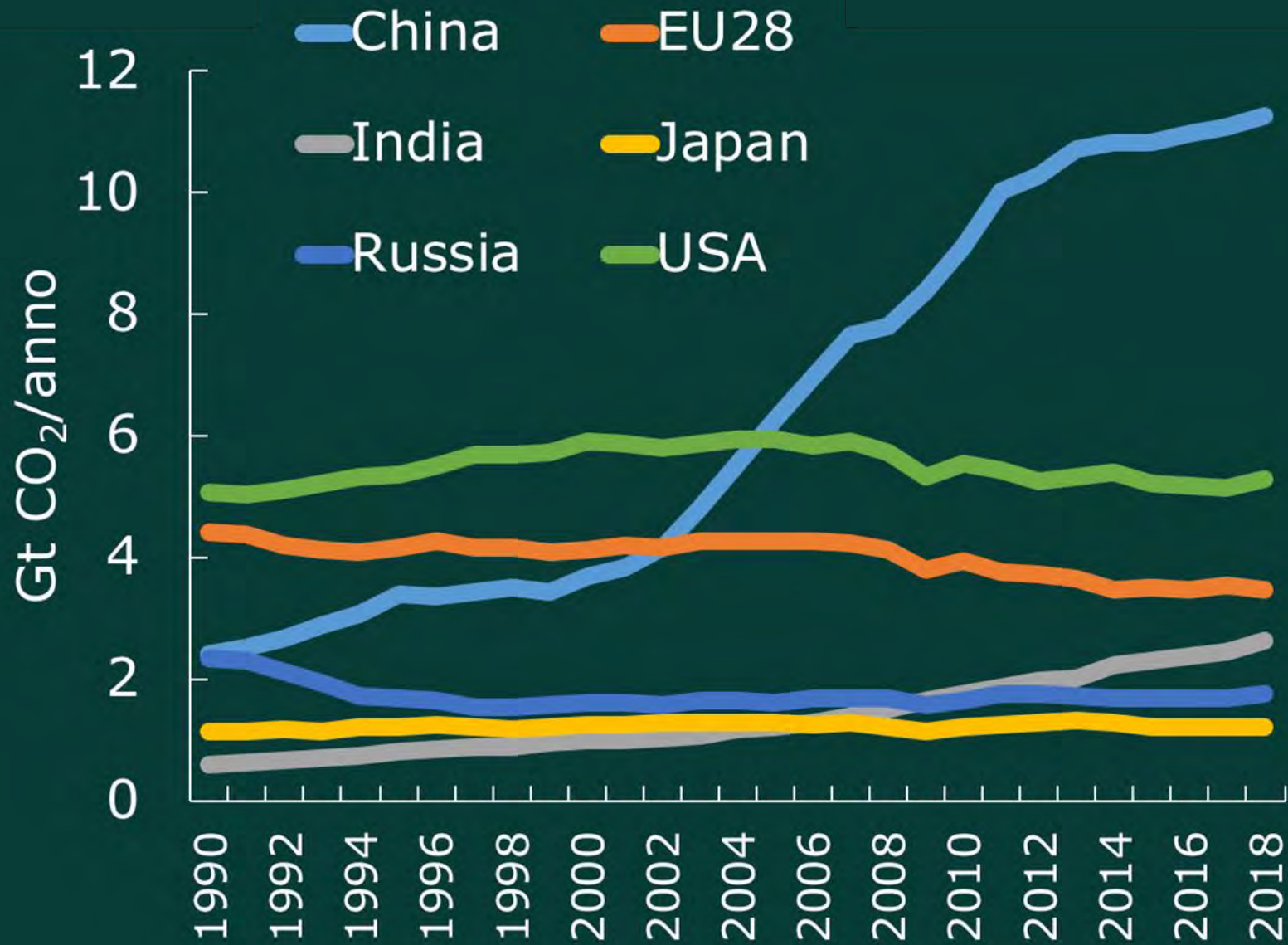


# “The Big Six”



<b>Nazioni</b>	<b>% globale</b>	<b>2018 vs 2017</b>	<b>Variazione annuale vs 2015</b>
Cina	29.7	1.5	1.3
Stati Uniti	13.9	2.9	0.3
UE28	9.1	-1.9	-0.3
India	6.9	7.2	4.7
Russia	4.6	3.6	1.1
Giappone	3.2	-1.7	-0.8

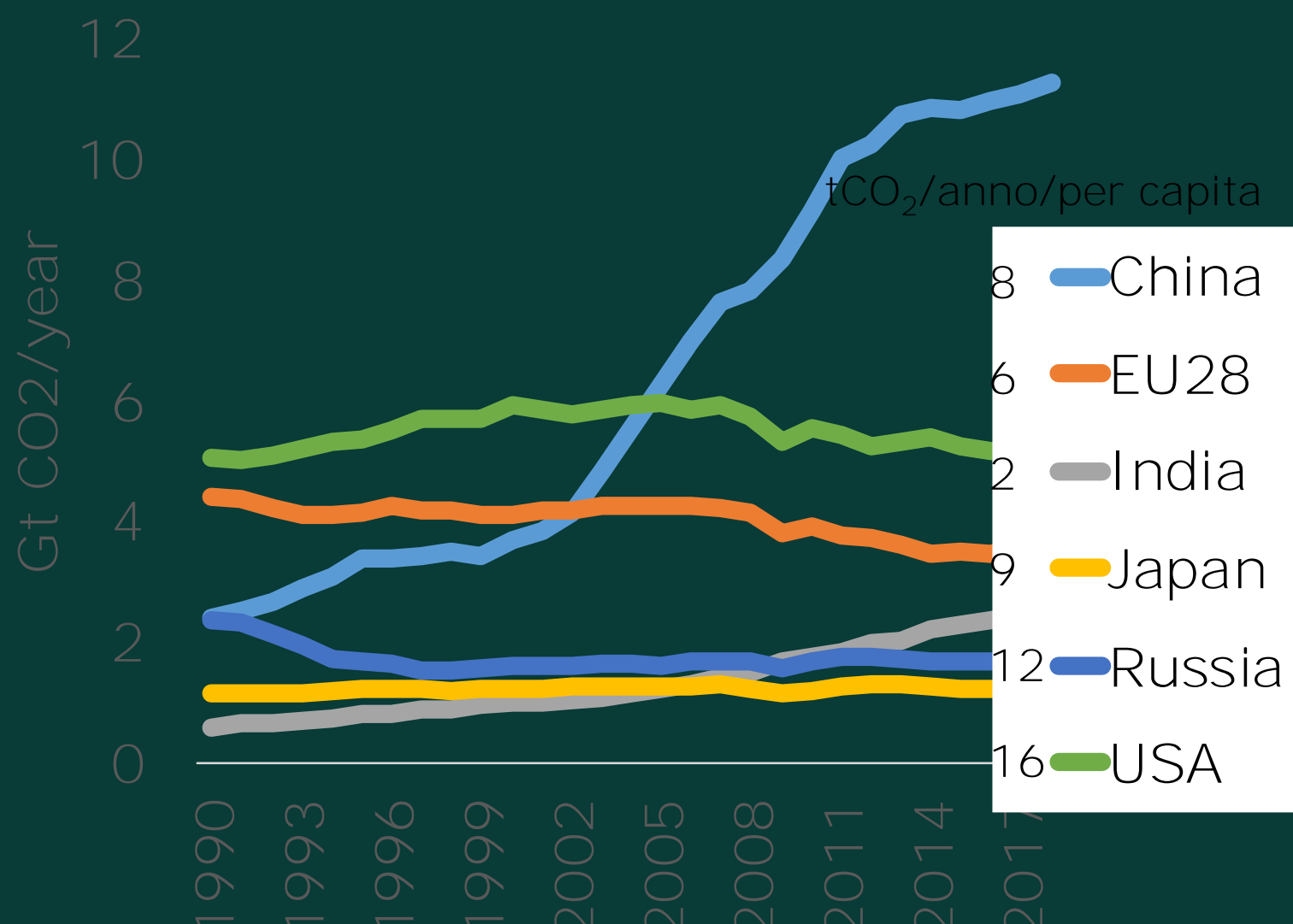
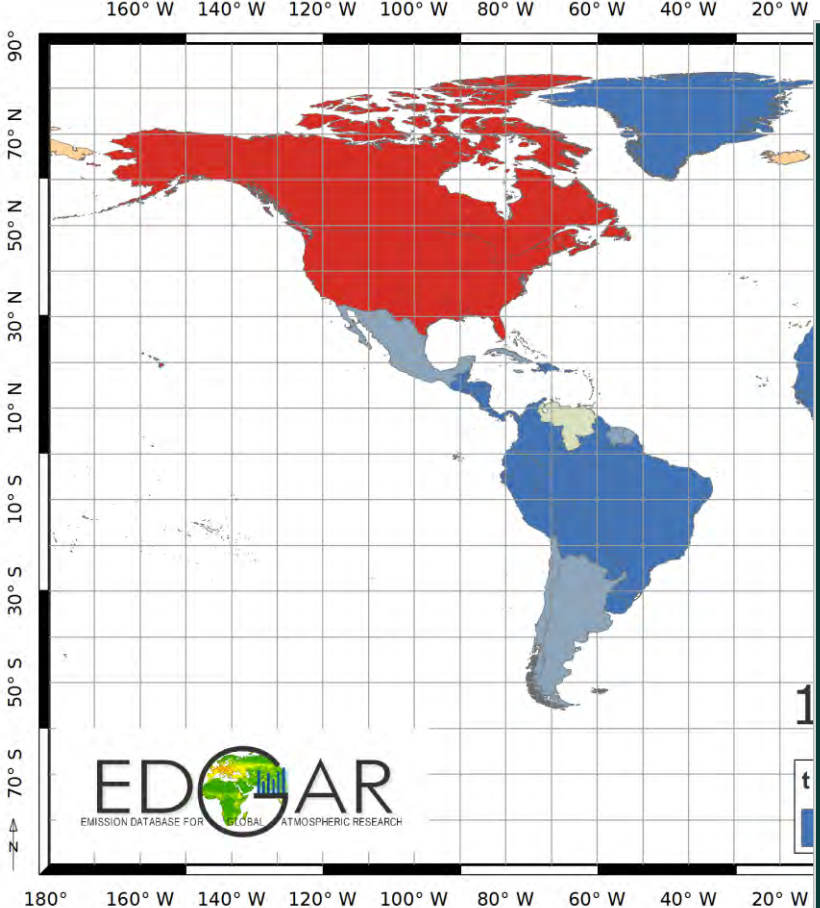
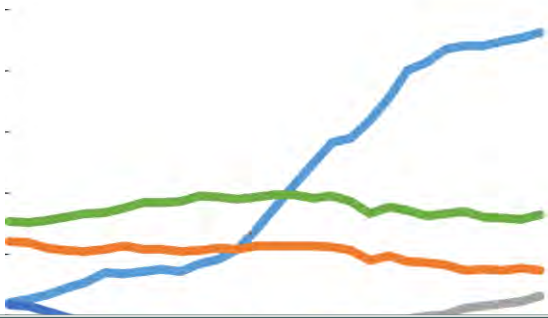




## ***“The Big Six”***

# Emissioni di CO<sub>2</sub> per capita e per anno

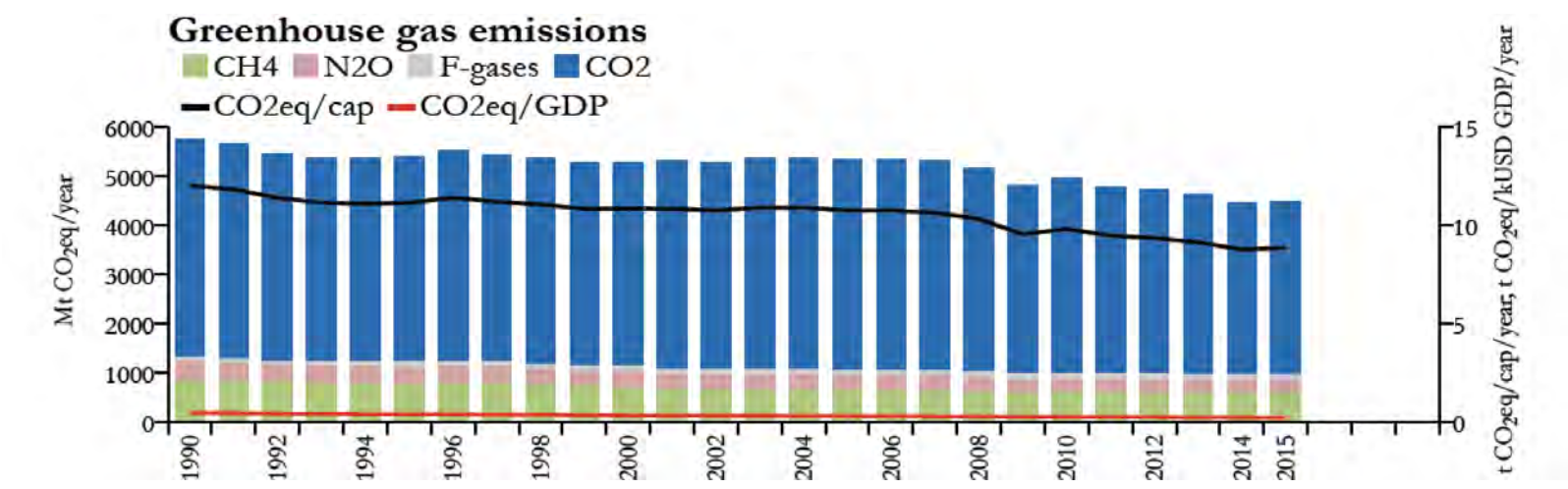
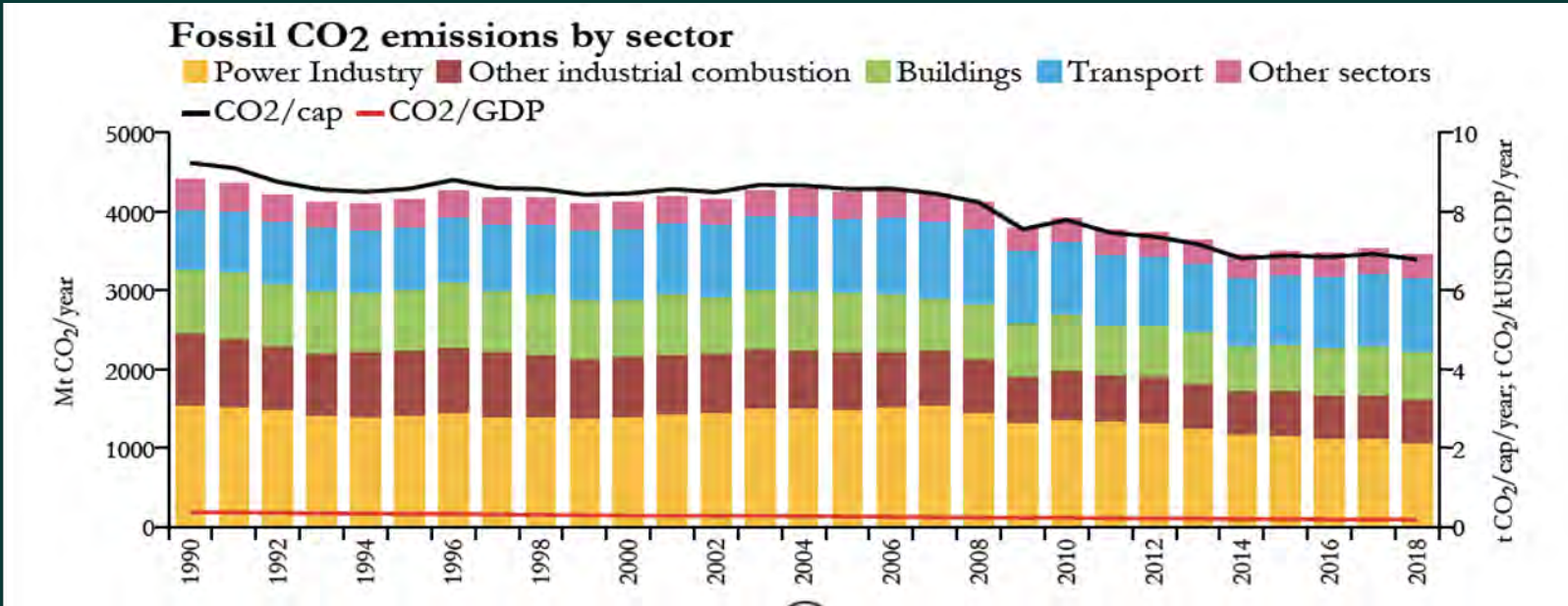
*in 2018 globale= 5 ton CO<sub>2</sub>/anno/capita*



# Nell'Unione Europea

$\text{CO}_2$ ,  $\text{CH}_4$  e  $\text{N}_2\text{O}$



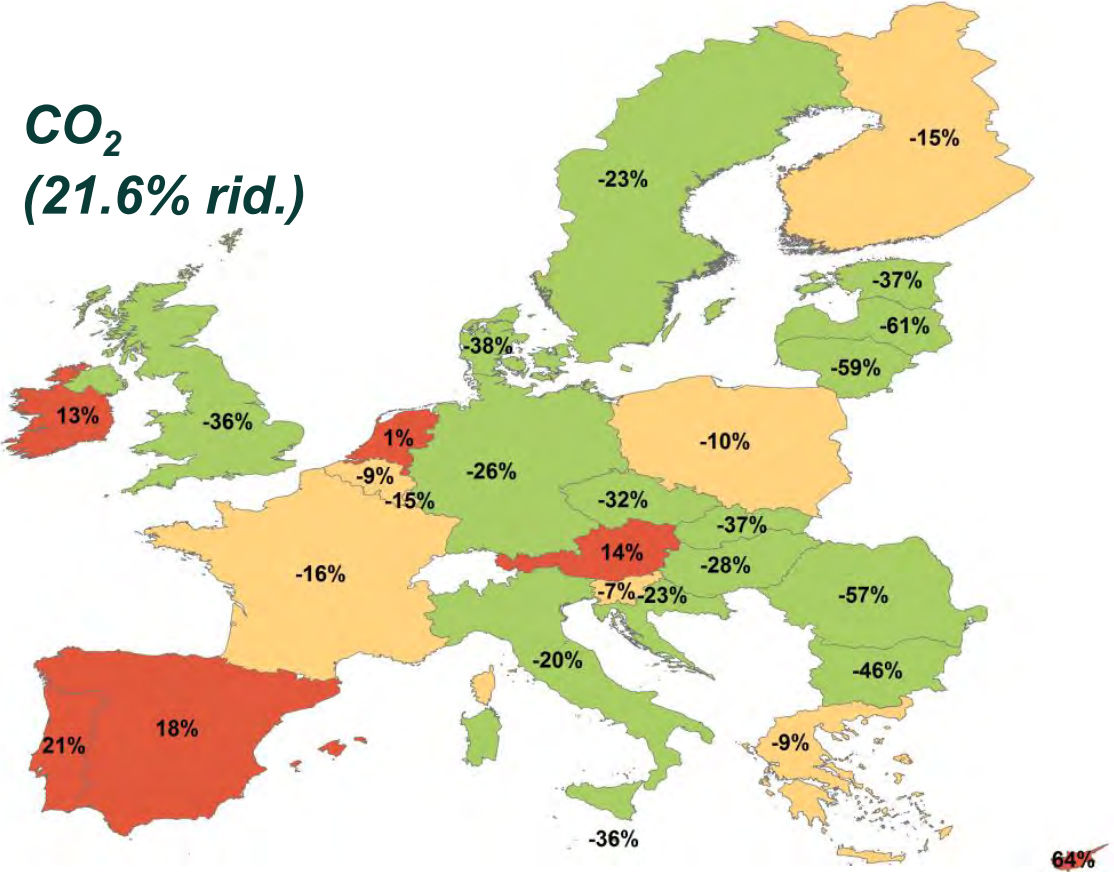


# Andamenti di GHG in UE per settore

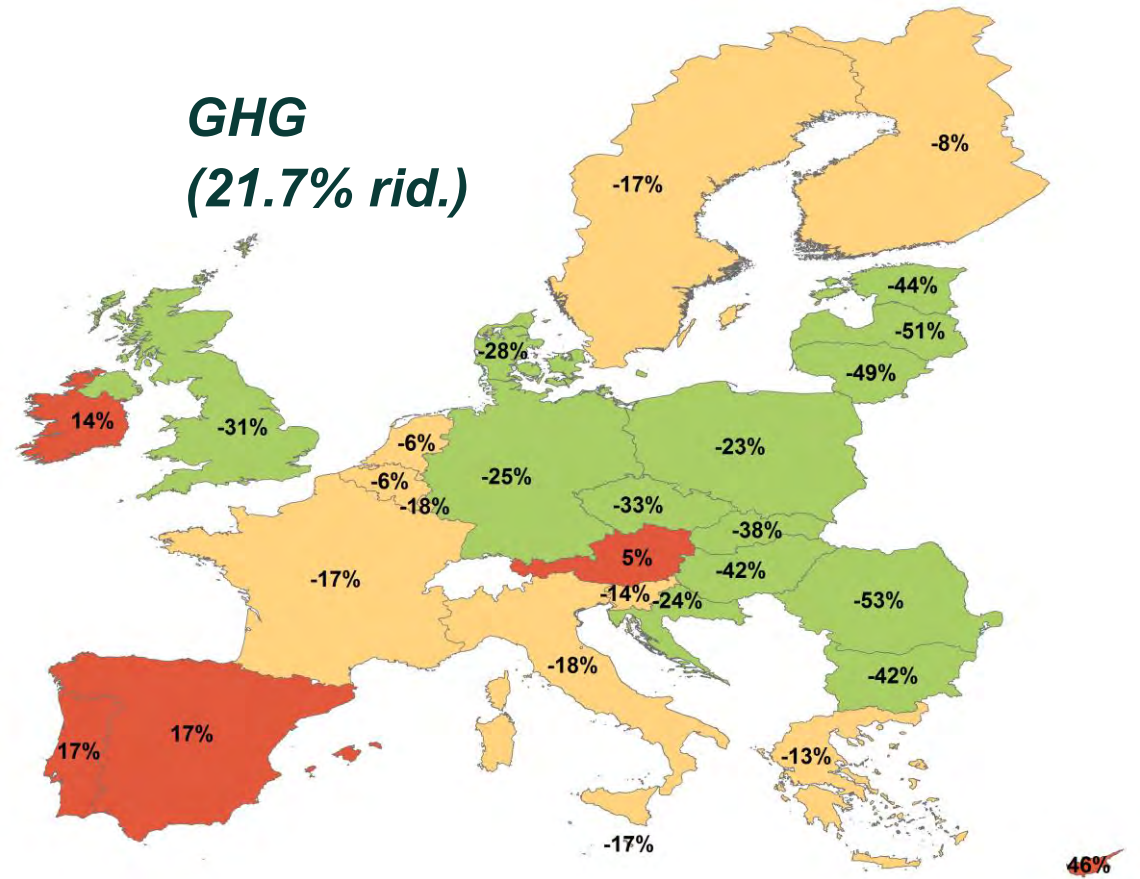
# Andamenti delle emissioni di CO<sub>2</sub> e dei GHG nella UE28 vs 1990



**CO<sub>2</sub>**  
(21.6% rid.)



**GHG**  
(21.7% rid.)























- Più' del 20% di riduzione vs. 1990
- Diminuizione vs. 1990
- Aumento vs. 1990



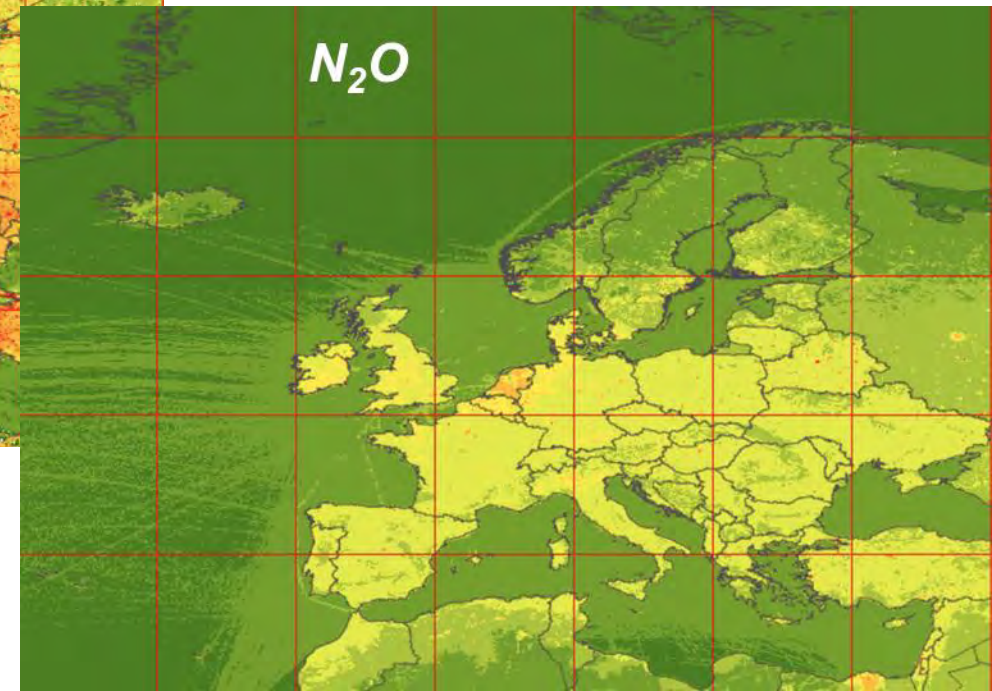
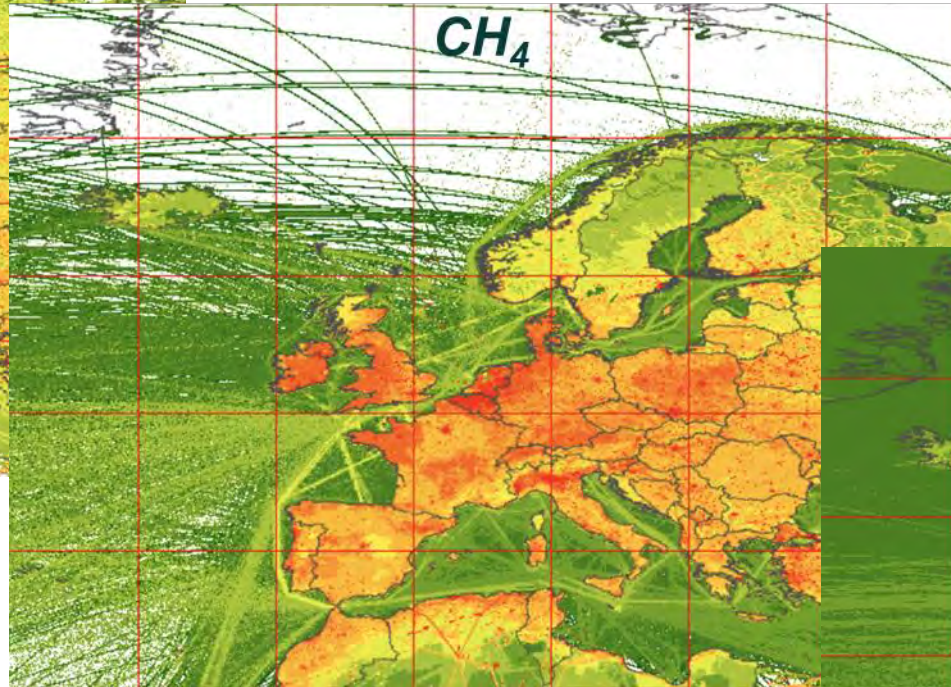
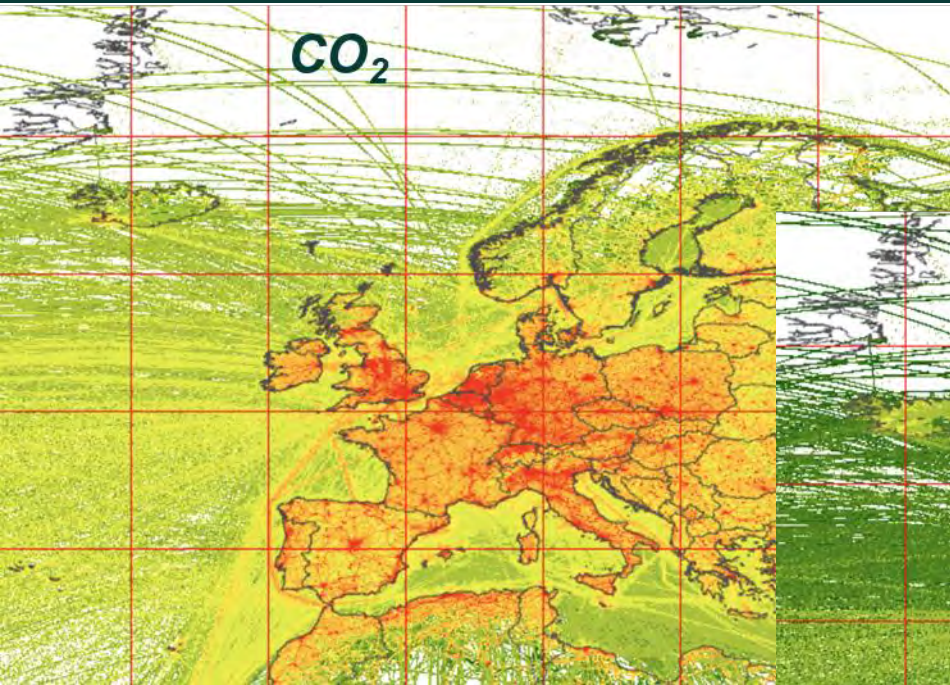


# Analizzando il comportamento dei singoli settori in UE28

		<i>CO<sub>2</sub> (2018 vs 1990)</i>	<i>GHG (2015 vs 1990)</i>	<i>GHG(2015 vs 2005)</i>
	Power Industry	 -30%	 -24%	 -22%
	Other industrial combustion	 -40%	 -39%	 -22%
	Buildings	 -24%	 -26%	 -21%
	Transport	 +21%	 +16%	 -7%
	Other sectors	 -20%	 -25%	 -8%



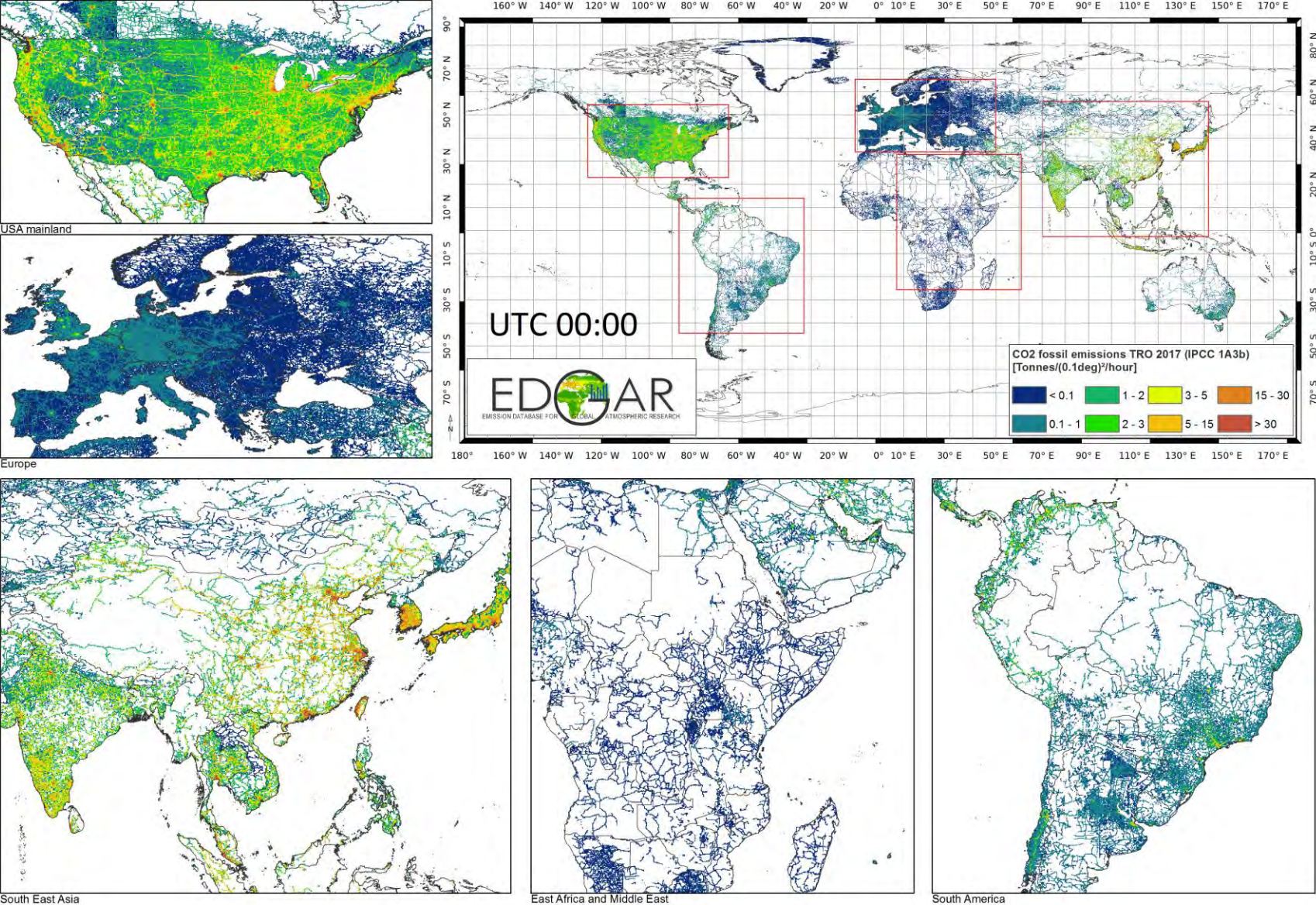
# Distribuzione delle sorgenti dei principali gas serra





# Profili temporali CO<sub>2</sub>

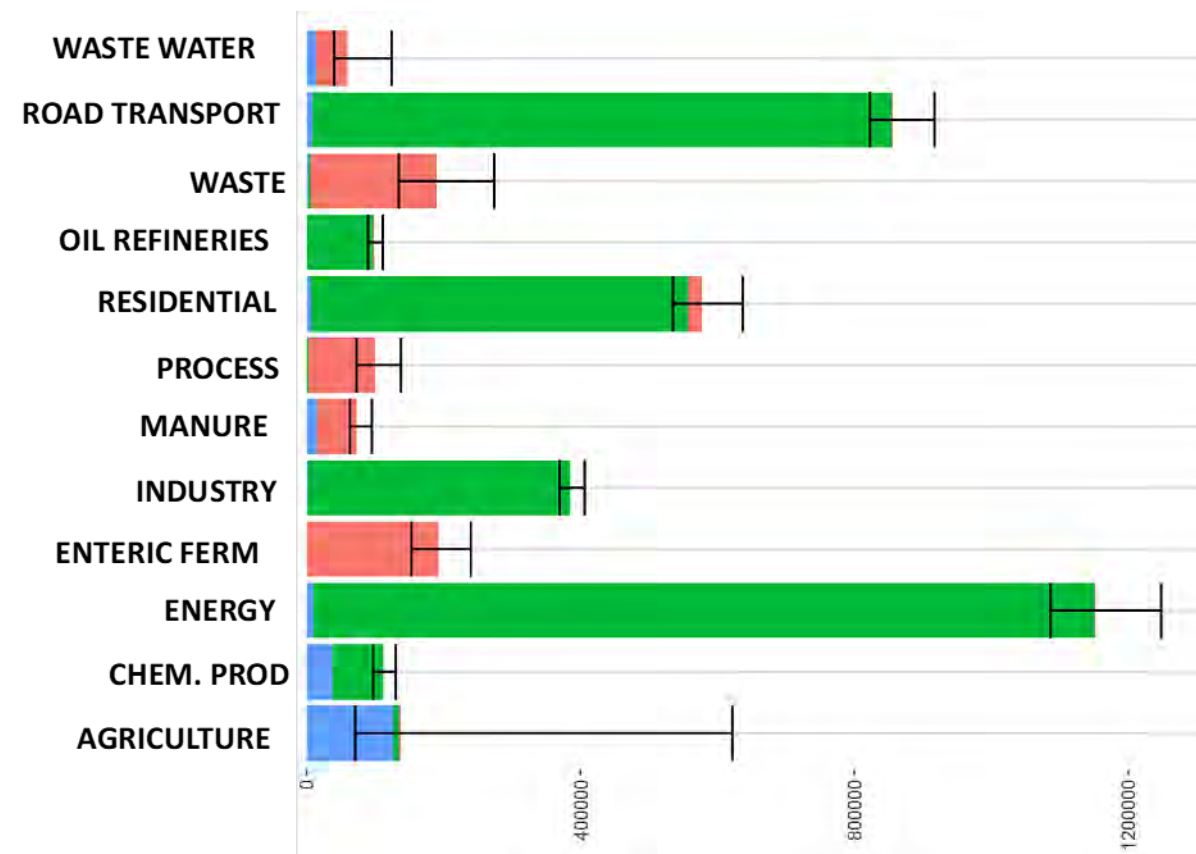
*Trasporto su strada; dati orari, Gennaio 2017*



# Incertezze degli inventari

□	CO <sub>2</sub>	:	5-15%
□	CH <sub>4</sub>	:	32-57%
□	N <sub>2</sub> O	:	42-93%

Janssens-Maenhout et al, ESSD, 2019





# Prospettive future





**RIO Summit  
Adoption of  
UN Framework Convention  
on Climate Change (UNFCCC)**

**United Nations  
created**

**Intergovernmental  
Panel on Climate Change**

**United Nations  
talks about a  
Global Climate Agreement**

**Kyoto Protocol  
Promises to decrease  
Emissions (1998-2012)**

**Bali roadmap  
Decisions on mitigation  
actions**

**Copenhagen accord  
No new treaty**

**Paris Agreement**

**Cancun agreement  
Set a target to limit warming  
below 2 degrees**

1988

1990

1992

1997

2007

2009

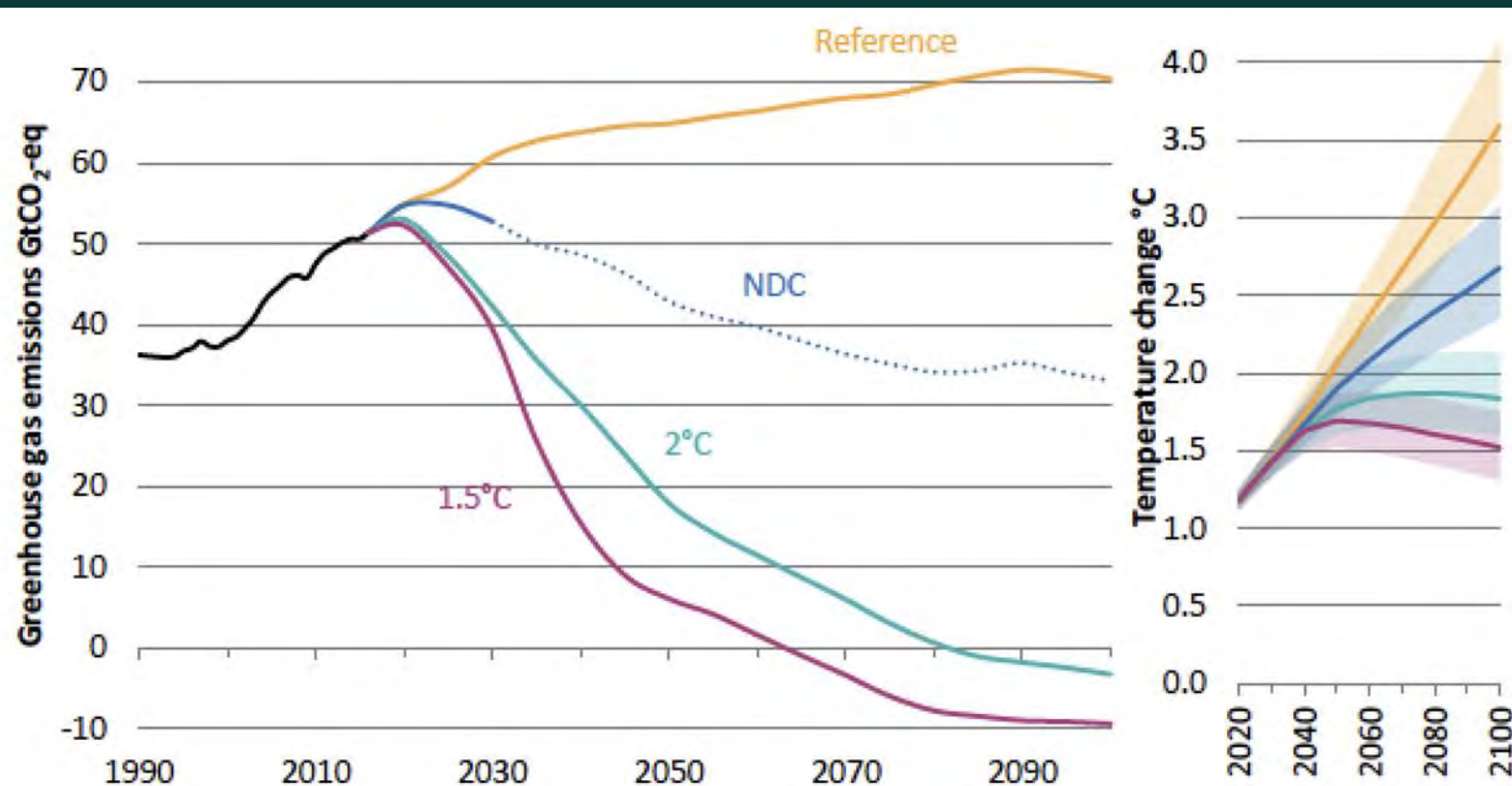
2010

2015

# Accordi internazionali



# Proiezioni di emissioni globali di GHG (e della temperatura)



**Reference:** non ci sono nuove politiche

**NDC:** obiettivi annunciati dalle Nazioni, Paris Agreement

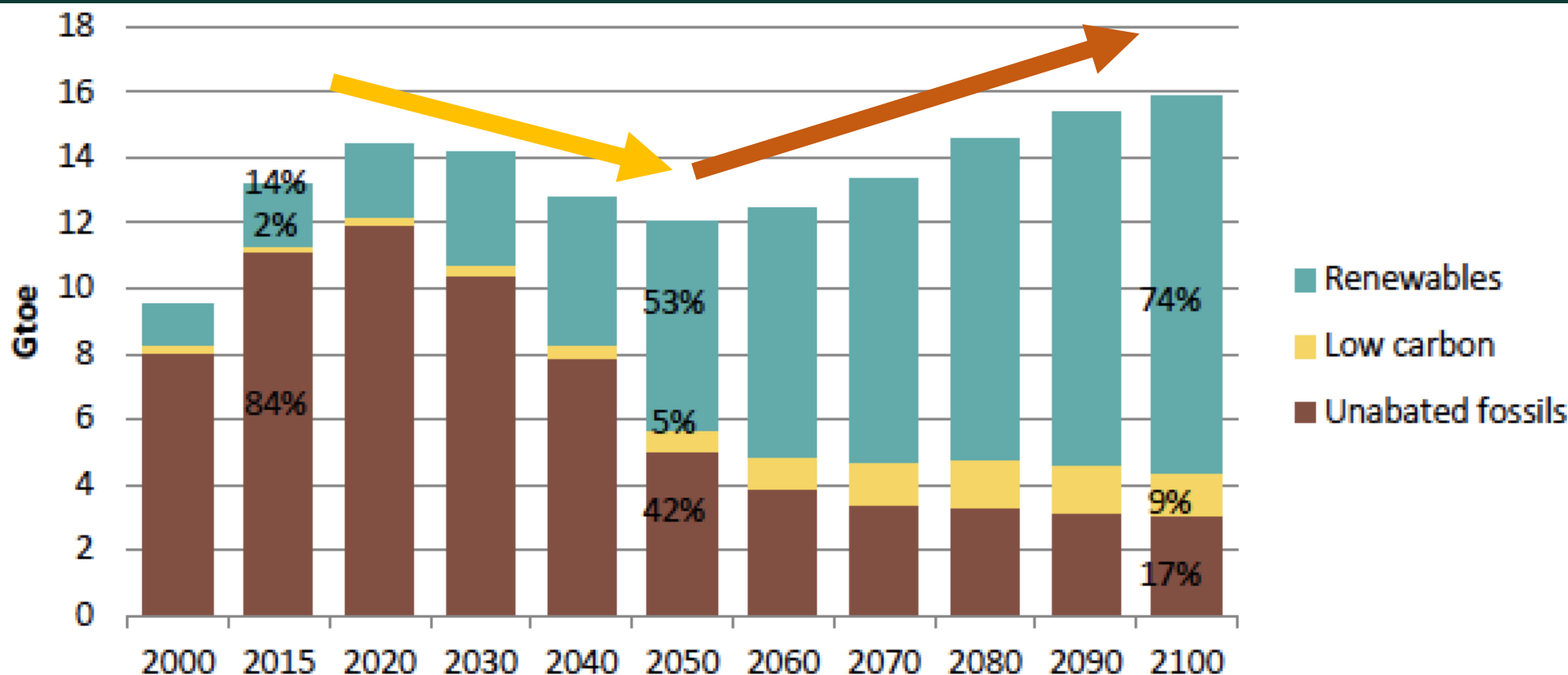


# Fabbisogno energetico primario globale *caso dello scenario a 2 gradi*



*efficienza  
energetica*

*Crescita  
economica e  
degli standard  
di vita*





*RIO Summit  
Adoption of  
UN Framework Convention  
on Climate Change (UNFCCC)*

*United Nations  
created*

*Intergovernmental  
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1988

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2015

1997

2003

2008

2011

2014

2018

*Emission Trading  
Directive*

*Europe 2020  
Reduction of 20% GHG  
emissions by 2020*

*2030 Climate and  
Energy framework  
Reduction at least  
40% GHG emissions  
by 2030*

*Long-term vision  
for a climate  
neutral economy  
by 2050*

*European Union  
8% reduction vs 1990*

*Roadmap to a low-carbon  
economy. Reduction up to  
80% GHG emissions by 2050*

EUROPEAN UNION

# Accordi internazionali e legislazione Europea







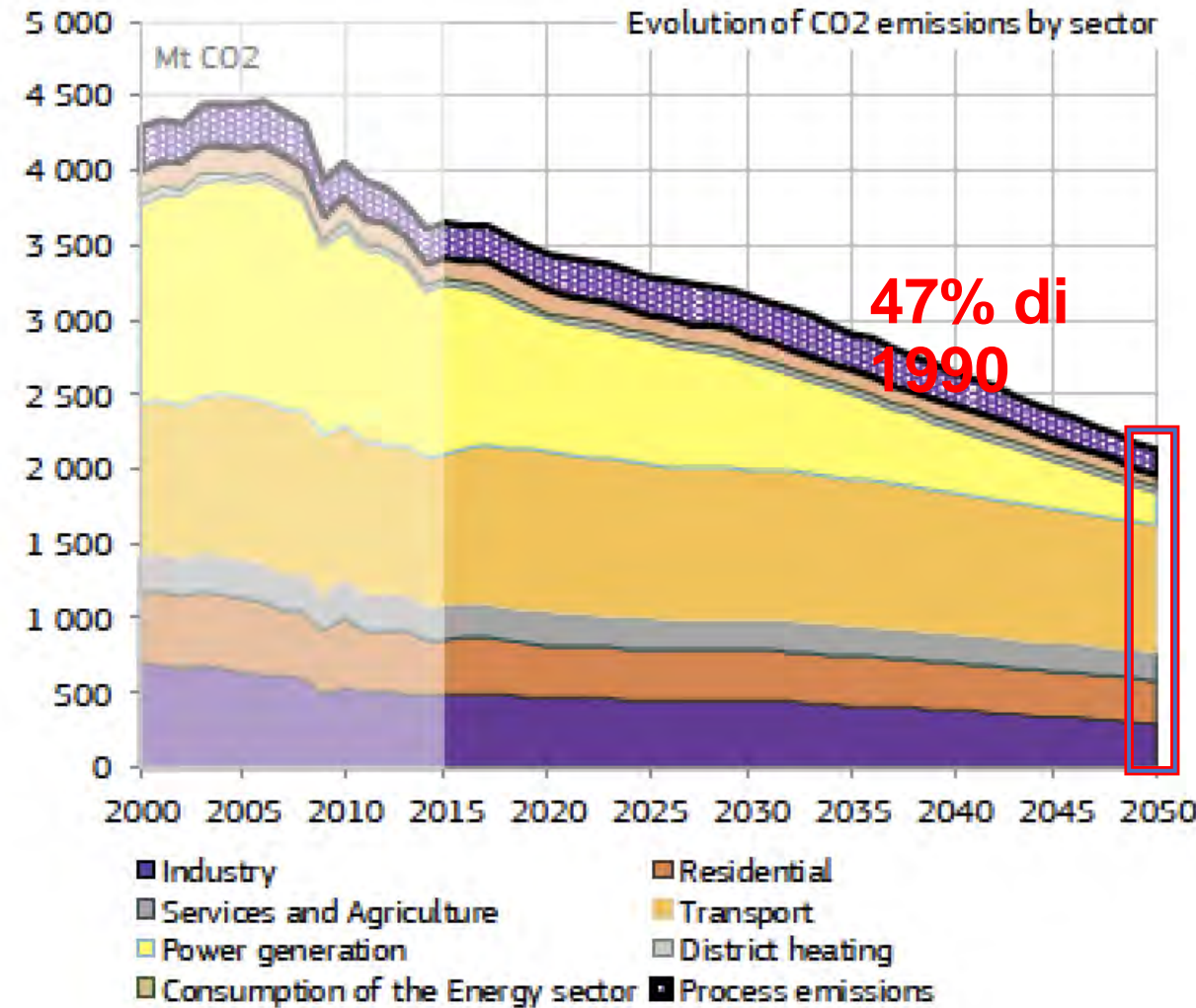
# Evoluzione delle emissioni di CO<sub>2</sub> con le attuali politiche climatiche

*Disaccoppiamento fra le emissioni di CO<sub>2</sub> e le attività economiche*

*Progressi tecnologici di pari passo con politiche e cambiamenti strutturali*

*Non sufficiente a raggiungere l'impatto zero sul clima*

## Reference scenario





# Come raggiungere la neutralità nelle emissioni entro il 2050?



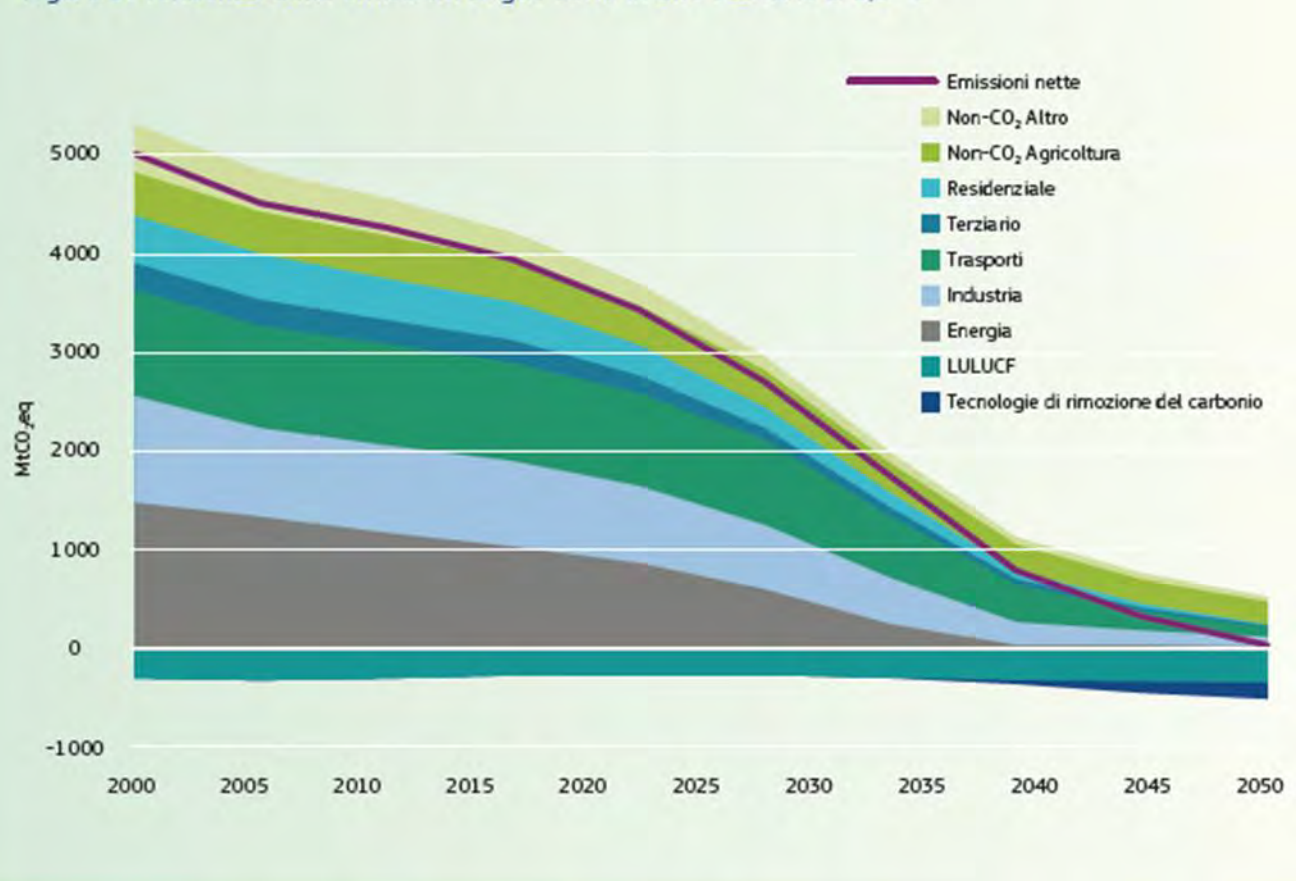
- *Efficienza energetica*
- *Energie rinnovabili*
- *Mobilità più pulita*
- *Industria competitiva e economia circolare*

- *Infrastruttura e interconnessione*

- *Bioeconomia e pozzi naturali di assorbimento del carbonio*

- *Cattura e sequestro del carbonio*

Figura 5. Tendenze delle emissioni di gas serra in uno scenario a 1,5 °C



# Priorita' della nuova Commissione Europea (2019-2024)

## *Clima*

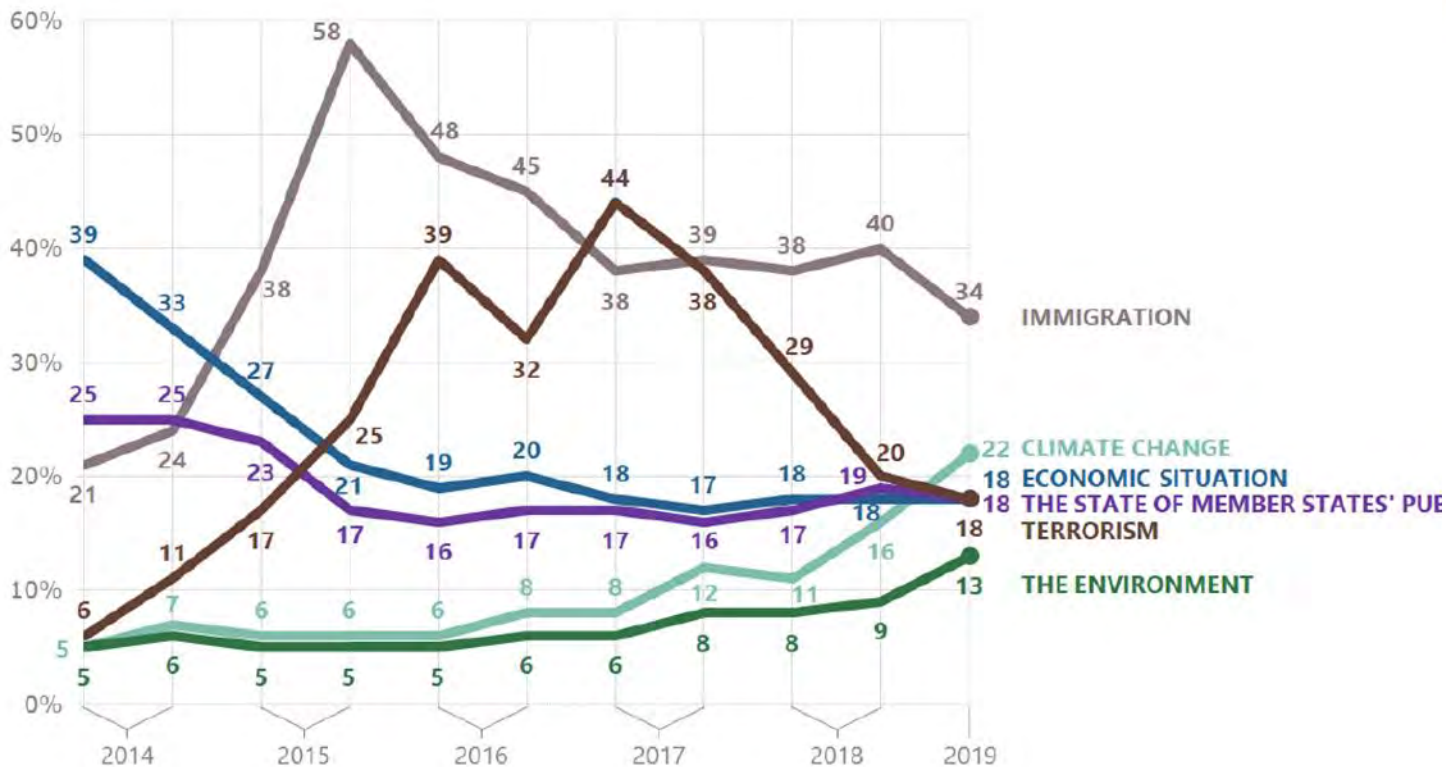
### **Priorita': A European Green Deal**

- 1) Diventare il 1° continente a impatto zero
- 2) Arrivare alla riduzione di emissioni del 55% per il 2030
- 3) European Climate Law per legiferare il raggiungimento **dell'impatto zero sul clima per il 2050**
- 4) Estendere Emission Trading System
- 5) European Climate Pact (regioni, comunità locali, società civile, industria, scuole)



# Preoccupazione crescente per i cittadini Europei che si aspettano azioni

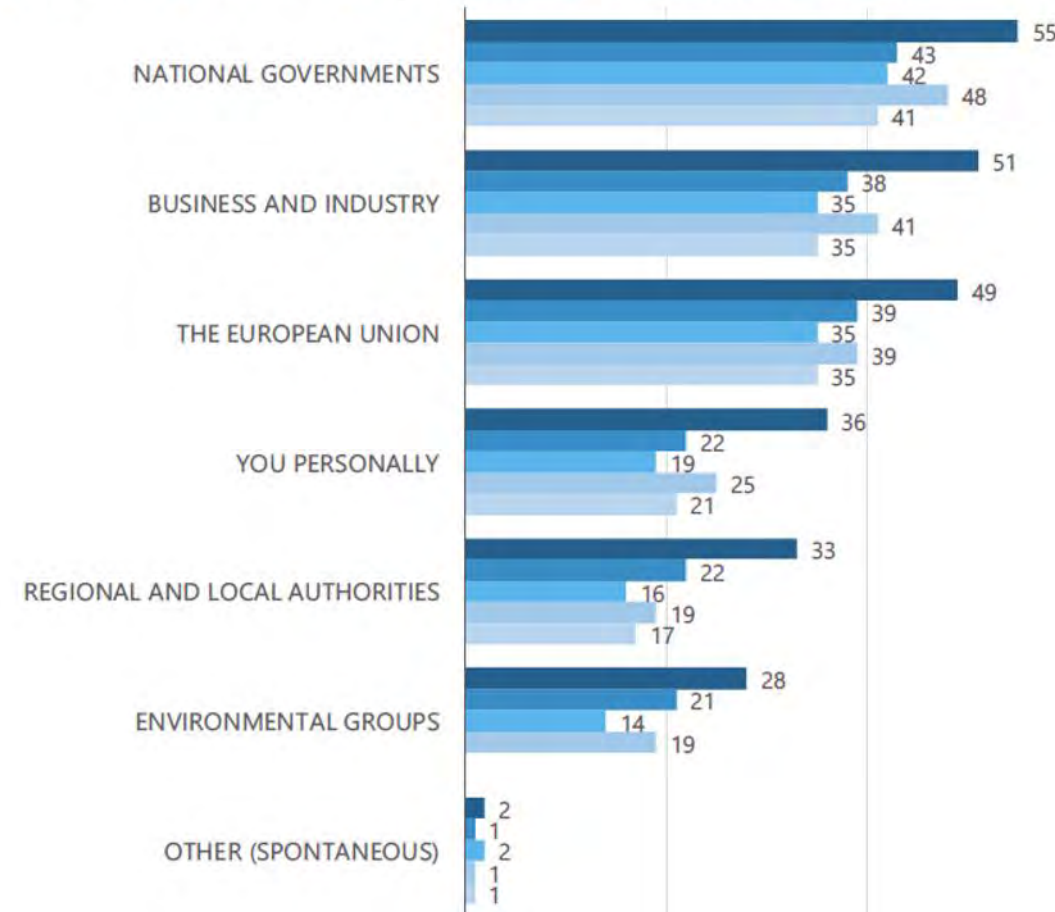
Q5 What do you think are the two most important issues facing the EU at the moment?  
(% - EU)



In your opinion, who within the EU is responsible for tackling climate change? (MULTIPLE ANSWERS POSSIBLE)

(% - EU28)

Legend: April 2019, Mar. 2017, May-June 2015, Nov.-Dec. 2013, June 2011



European Commission, 2019 Eurobarometer (486 e 490)





**Monica Crippa, Marilena Muntean,  
Diego Guizzardi, Gabriel Oreggioni, Edwin Schaaf,  
Efisio Solazzo, Fabio Monforti-Ferrario,  
Marlene Duerr**





# On Science Hub

<https://ec.europa.eu/jrc/en/research-topic/air-quality>

<https://ec.europa.eu/jrc/en/research-facility/european-reference-laboratory-air-pollution>

<https://ec.europa.eu/jrc/en/research-facility/greenhouse-gas-monitoring>