

# The impact of international shipping on European air quality and climate forcing

John van Aardenne (EEA)



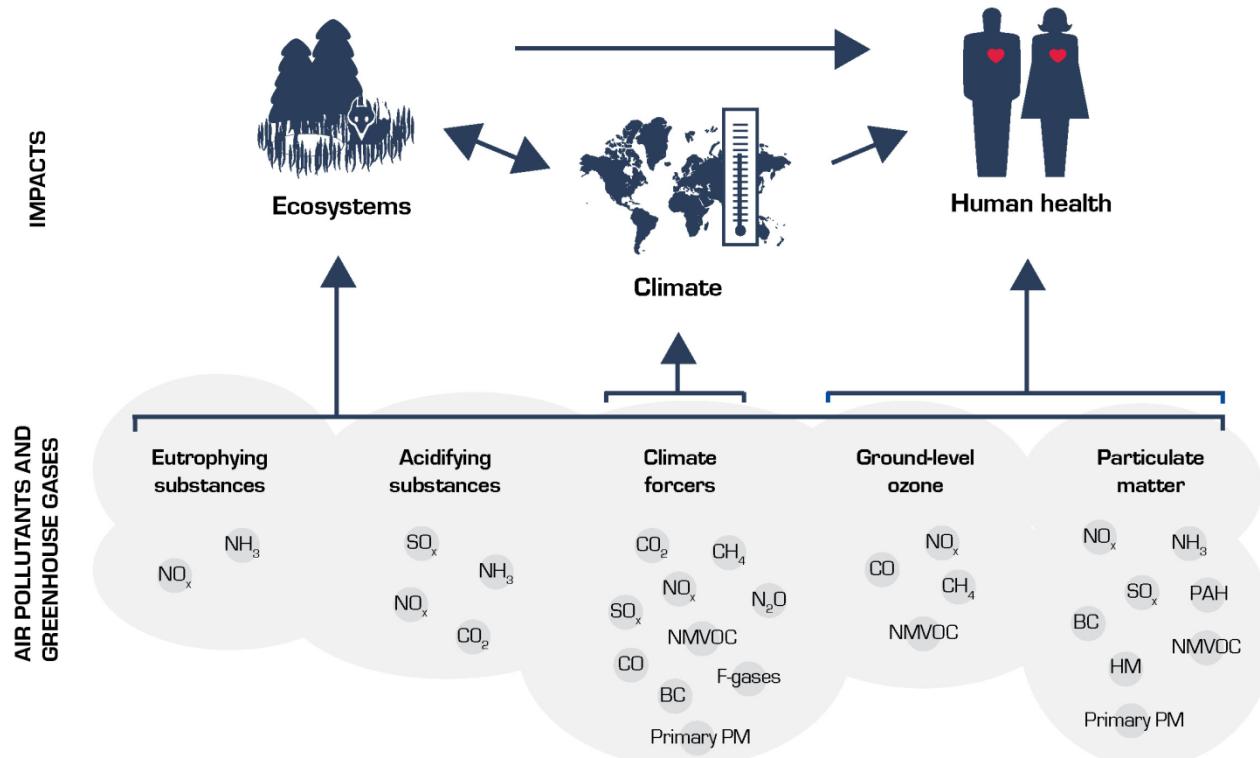
A consistent, European wide approach for monitoring, reporting and verification of both GHGs and air pollutant emissions from the shipping sector is key to address its contribution to climate change and air quality in tandem.

There is a strong need for further harmonization of emissions information from the shipping sector across Europe.

Shipping emissions can contribute significantly to local air quality problems in Europe, but the pan-European knowledge and observation base needs to be improved to provide a more complete picture.



# International shipping and the environment: more than carbon.



EEA Report No 9/2013: Air quality in Europe - 2013

See also editorial in Carbon Management (June 2013, Vol 4. No. 3)

European Environment Agency



# Understanding air and climate impact requires insight in:

- registration of ships, international maritime law and international and European environmental legislation
- monitoring and modelling of maritime fuel consumption and resulting emissions
- past and future trends of air pollutants and greenhouse gas (GHG) emissions from shipping
- attribution of air quality problems to emissions from the maritime transport sector by evaluating atmospheric observations and modelling data
- understanding the climate forcing characteristics of ship emissions and atmospheric modelling

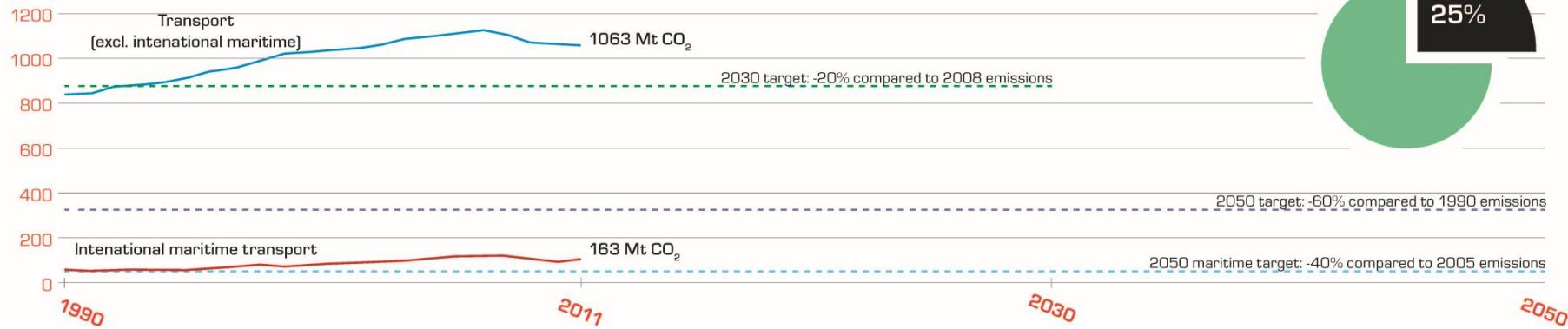


# EU's goal to reduce greenhouse gas emissions from transport

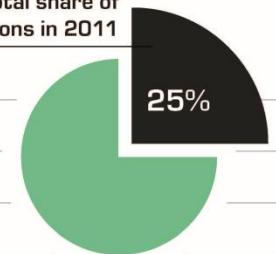
## Reducing environmental impacts of transport

Several EU targets have been set to reduce the environmental impacts of transport in Europe, including its greenhouse gas emissions. The transport sector's targets are part of the EU's overall goal to reduce greenhouse gas emission by 80-95% by 2050.

Key targets to be reached by 2050: Reduce transport (excl. international maritime) greenhouse gas (GHG) emissions by 60%, compared to 1990 levels and reduce international maritime transport emissions by 40%, compared to 2005.



Transport's total share of EU GHG emissions in 2011



Reduce international bunker GHG emissions by 40% by 2050, compared to 2005



Reduce transport oil consumption by 70% by 2050, compared to 2008



For each EU Member State, the share of renewable energy consumed in transport must be at least 10% by 2020.

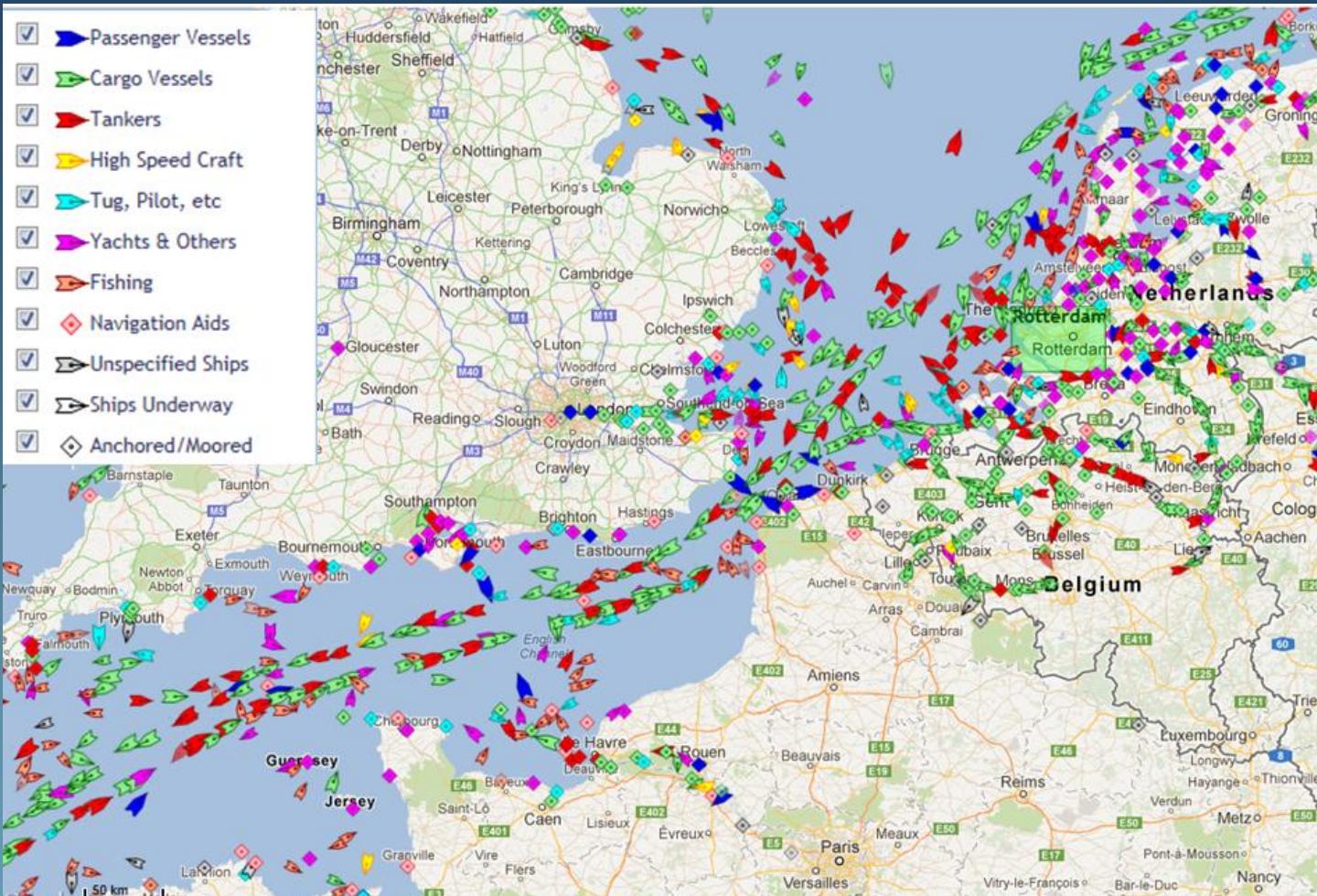


Reduce average CO<sub>2</sub> emissions of new cars to 95 g/km by 2020



Reduce average CO<sub>2</sub> emissions of new vans to 147 g/km by 2020

# Real-time ship traffic in the English Channel on October 08, 2012 at 10.40



For the EU, (EMSA) collects the AIS data for SafeSeaNet.

For the Baltic Sea, the Helsinki Commission (HELCOM) collects the AIS data.

Commercial ship-tracking initiatives

Source: [www.marinetraffic.com](http://www.marinetraffic.com)

European Environment Agency



## On monitoring of shipping activities (and resulting emissions)

Not trivial given the amount and variety of traffic.

Bunker fuels data from international statistics do not match activity based calculations (IEA vs IMO data)

The burden to monitor air pollutants is larger than monitoring fuel consumption and CO<sub>2</sub> emissions.

Information from a MRV focusing only on fuel consumption and CO<sub>2</sub> can to some extent be applied by standard emission calculation methodologies as provided in EEA/EMEP guidebook (thus providing insights in air pollutant emissions)

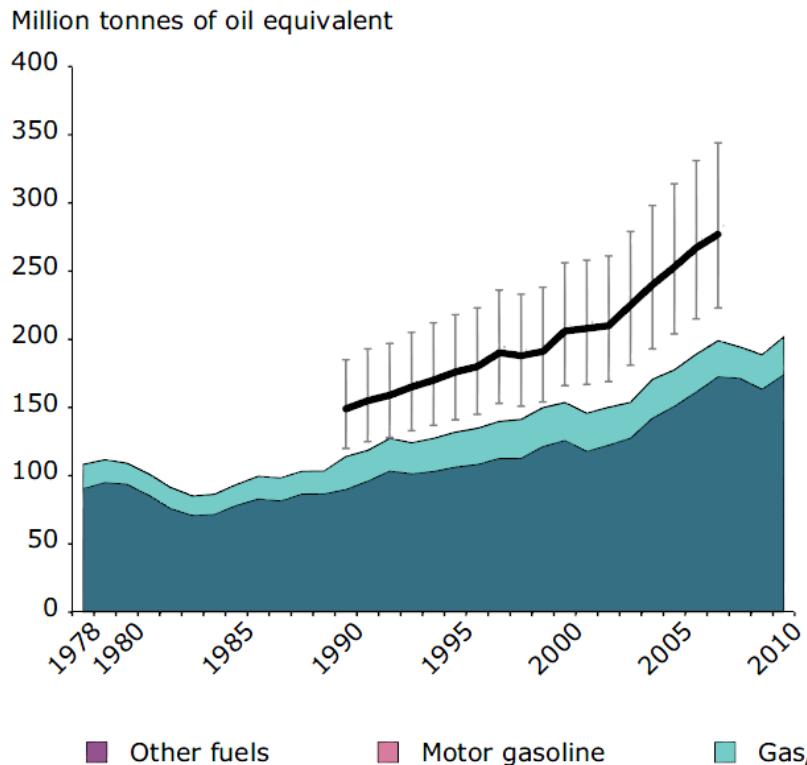
Issue of monitoring air pollutants will come back in relation to Clean Air Policy Package (offsetting NOx, SO<sub>2</sub>, PM2.5 from international maritime traffic within country sea area)

Note: international aviation data (GHG and AP) becoming available, project EEA-EUROCONTROL (funded by CLIMA)

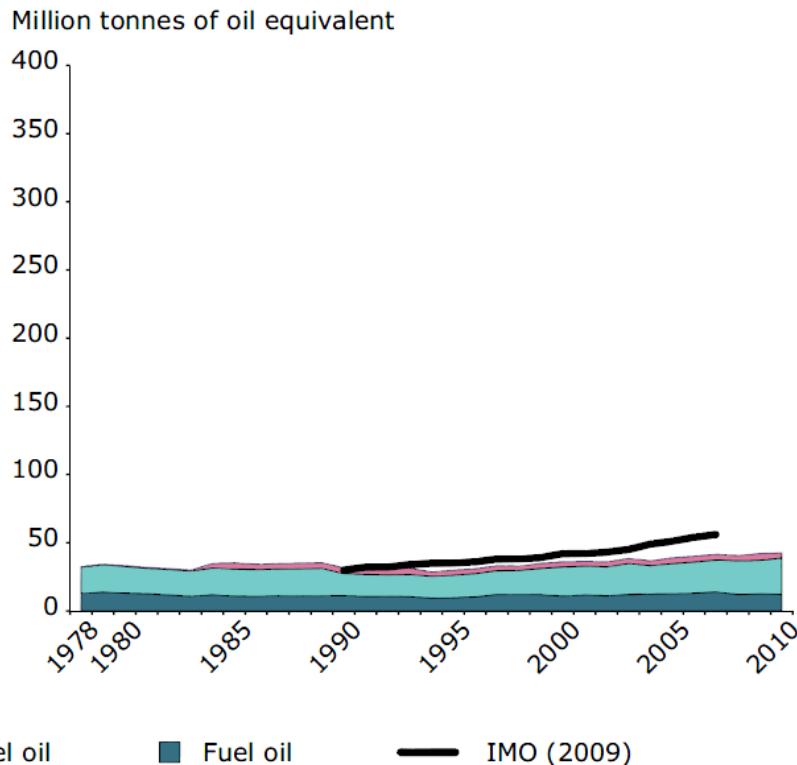


# Fuels delivered to international and domestic maritime transport

**International maritime transport**



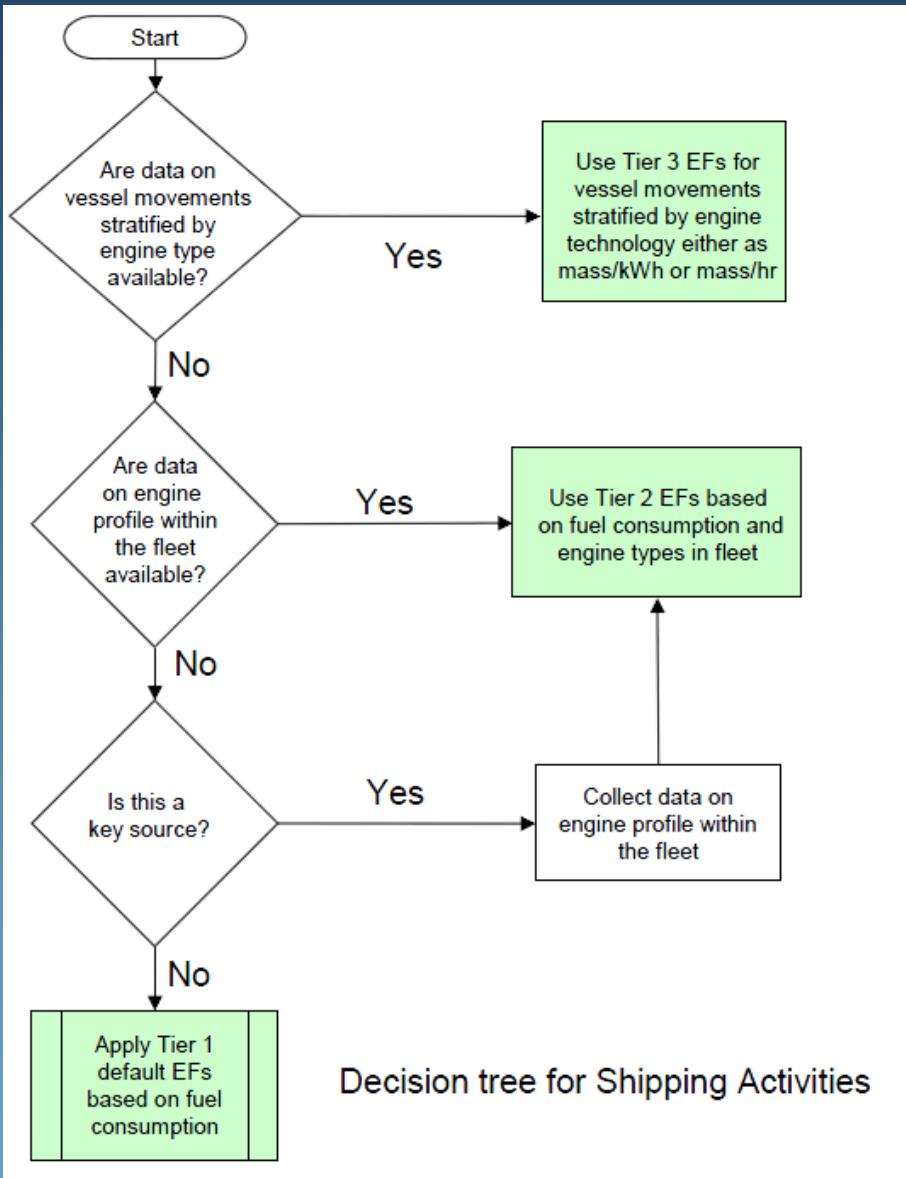
**Domestic maritime transport**



**Note:** Under IEA definitions, the statistics on international marine bunkers cover those quantities delivered to ships of all flags that are engaged in international navigation. Domestic navigation includes fuels delivered to vessels of all flags not engaged in international navigation. These amounts are used in inventory calculations as fuel consumed.

**Source:** EEA, based on IEA, 2012 and Buhaug et al., 2009.





## Fuel data requirements

Mass of fuel type used by vessels by engine type during the different phases of trip (cruise, hoteling and manoeuvring)

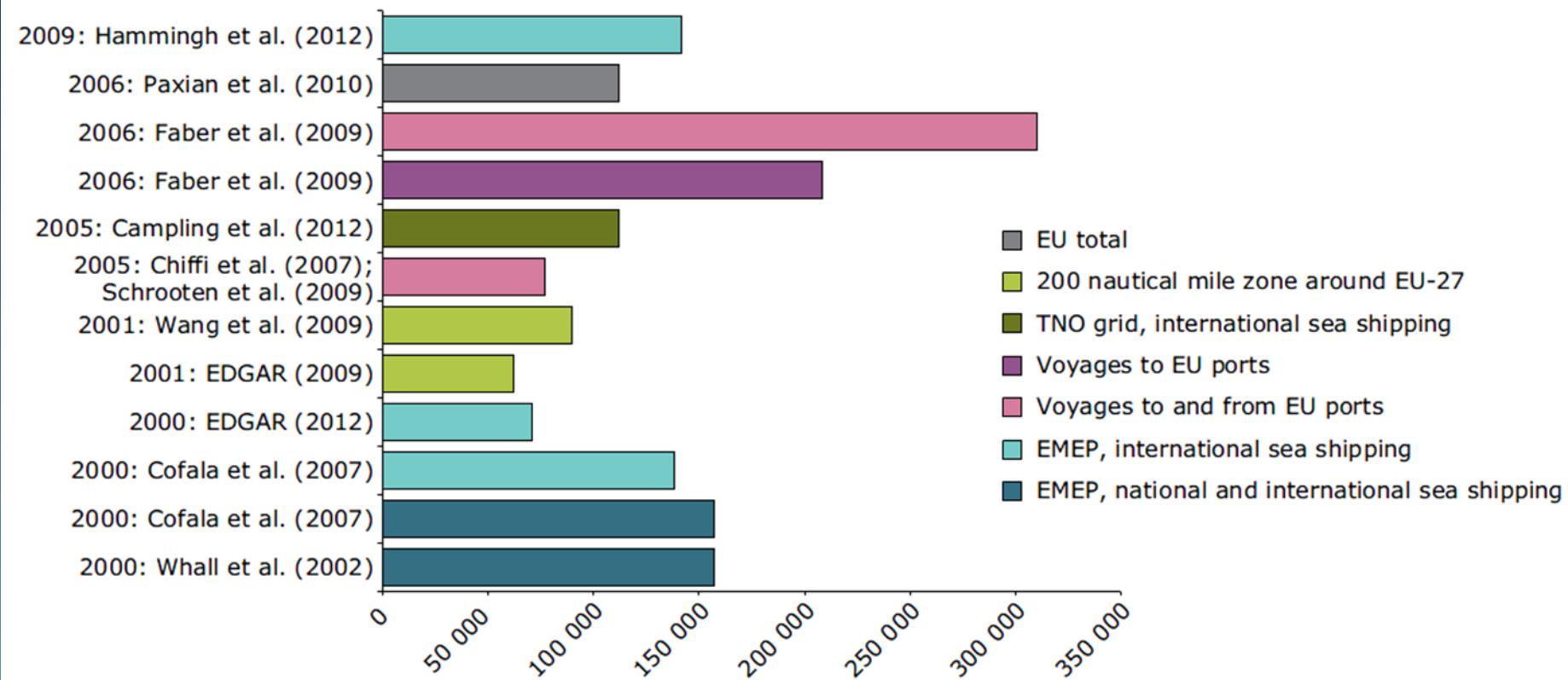
mass of fuel type used by vessels by engine type

mass of fuel type sold/used



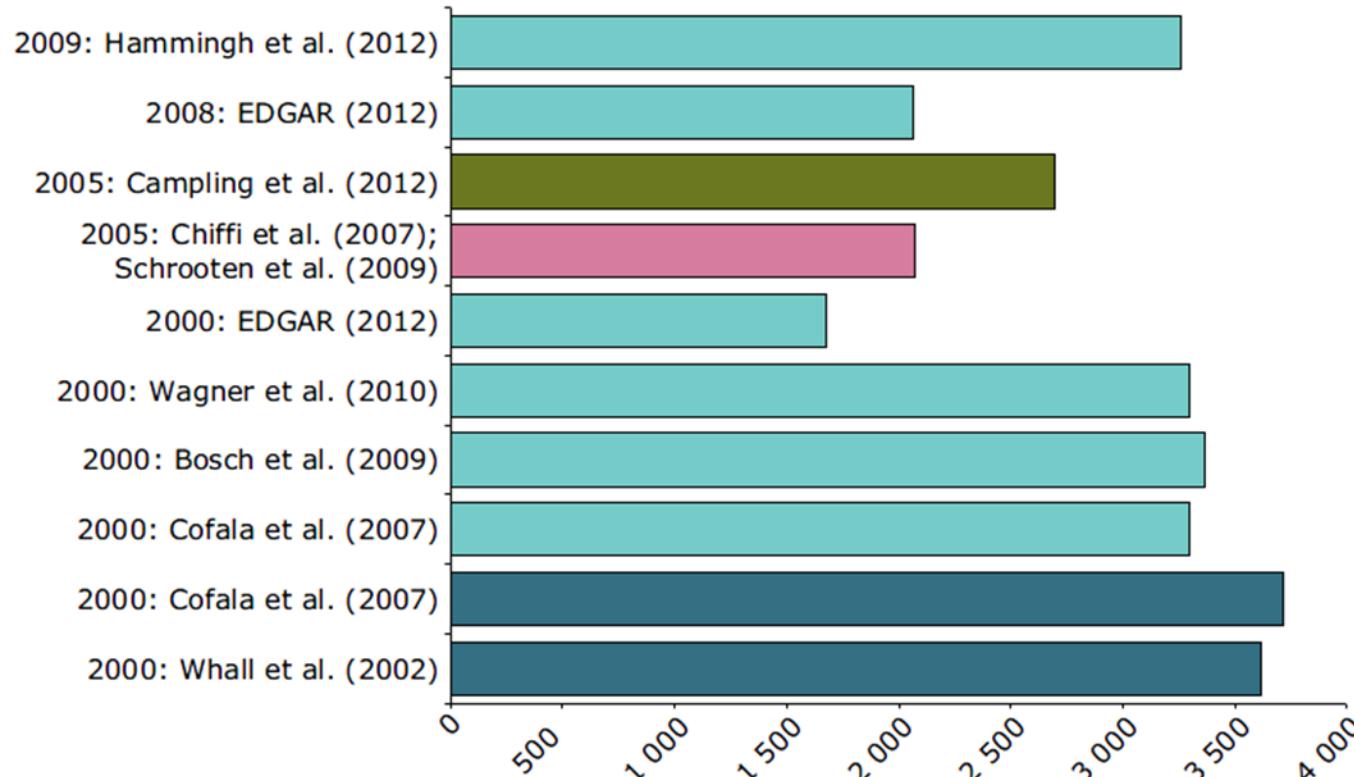
# Present day CO<sub>2</sub> emissions from shipping in Europe and European seas

CO<sub>2</sub> (kilotonnes)

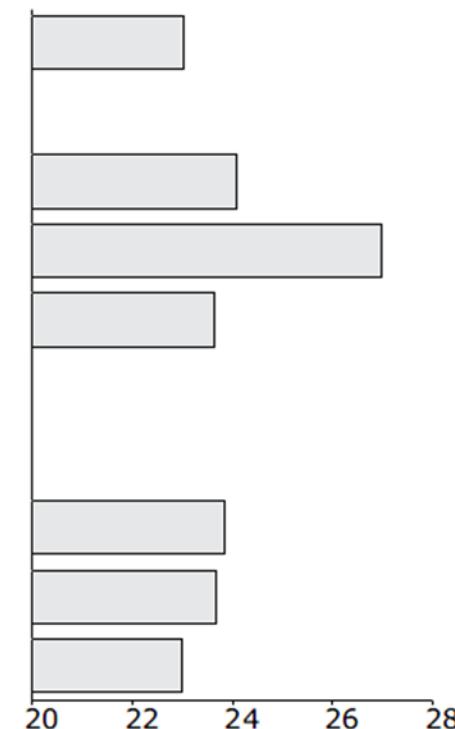


# Present day NO<sub>x</sub> emissions from shipping in Europe and European seas

NO<sub>x</sub> (kilotonnes)

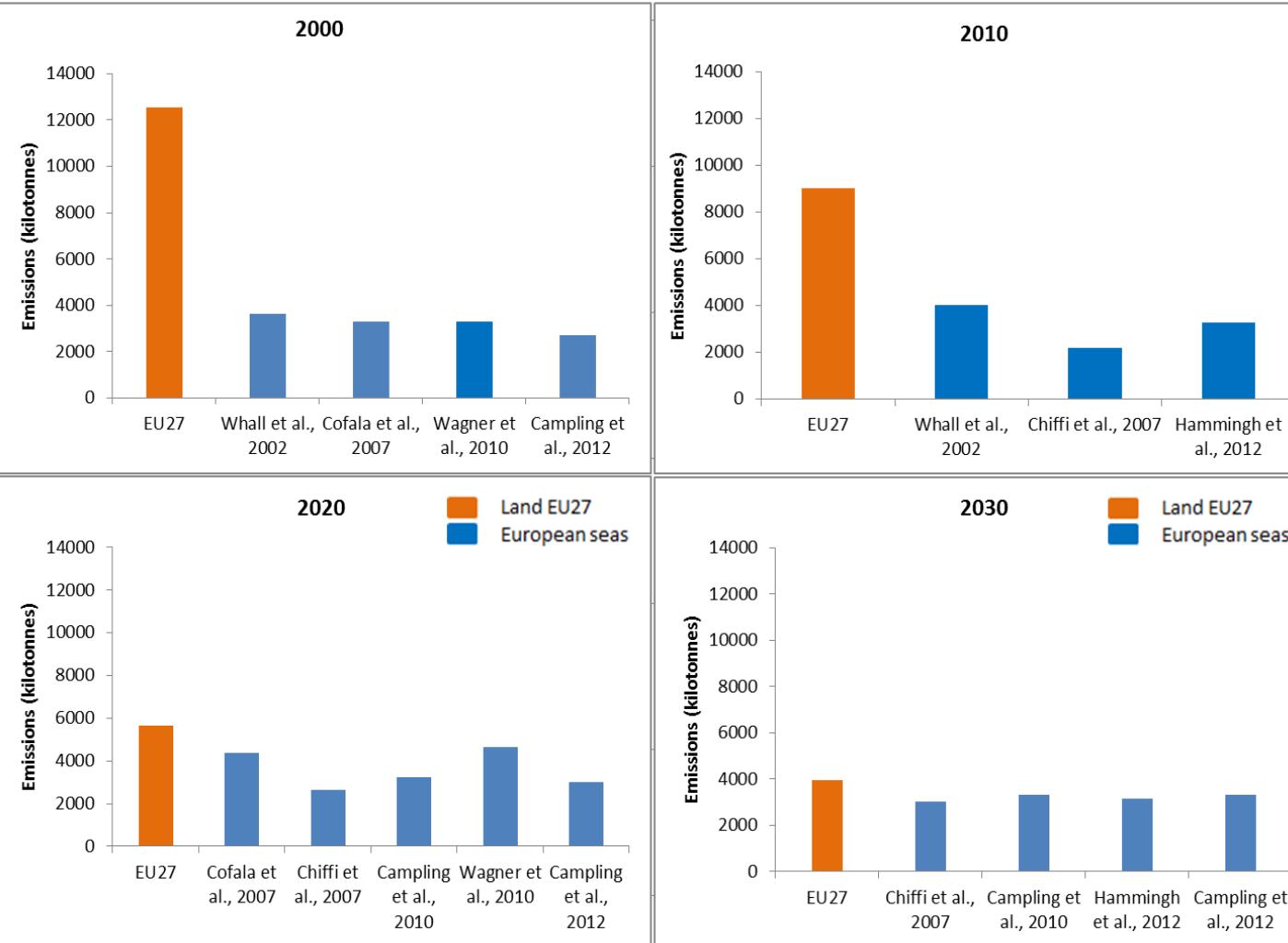


Tonne NO<sub>x</sub>/kilotonnes CO<sub>2</sub>

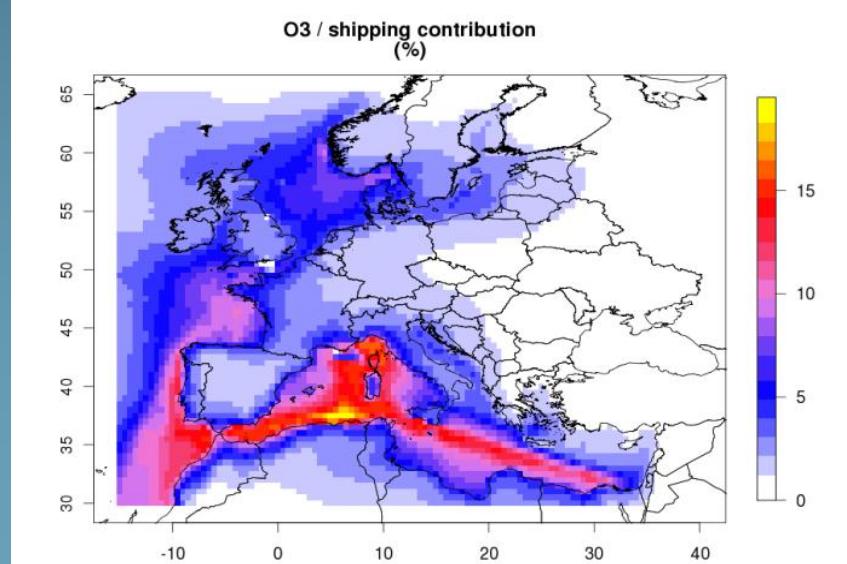
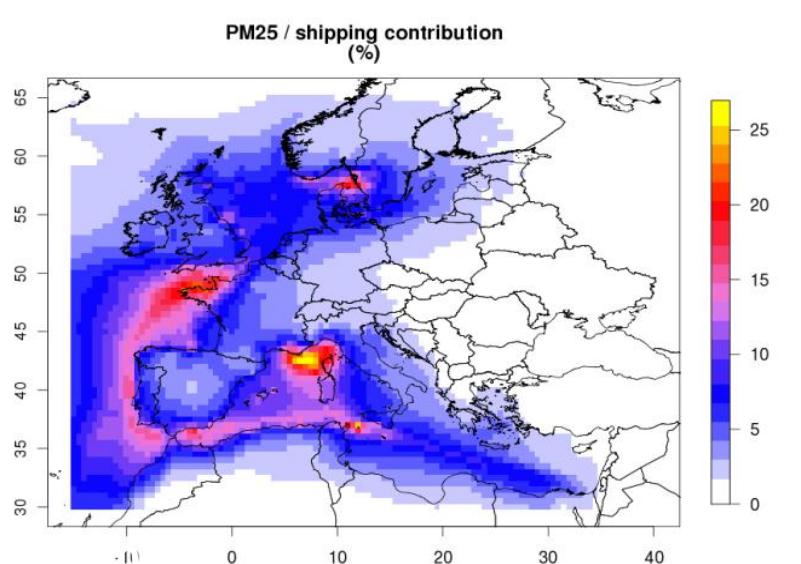
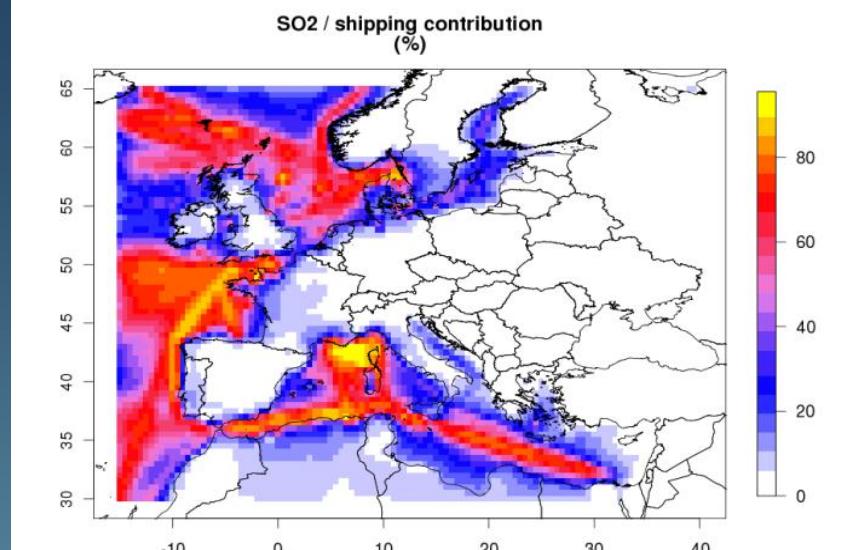
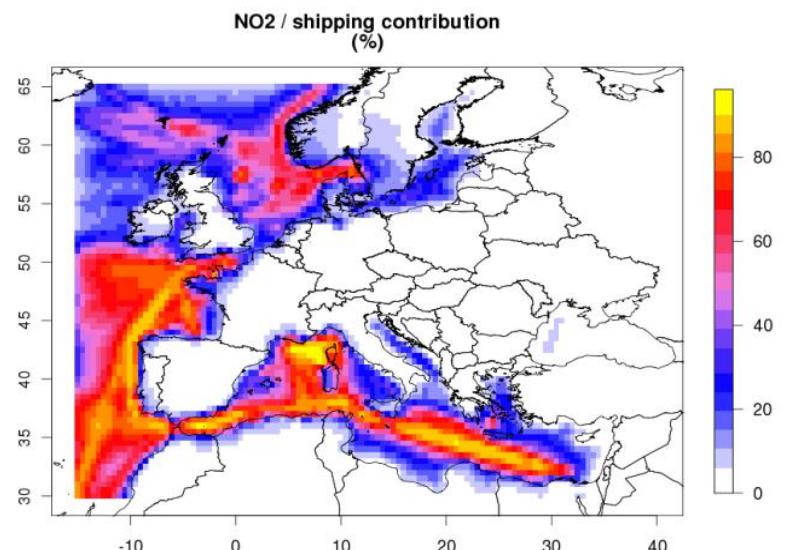


# Comparison of NO<sub>x</sub> emission trends between EU27 land based sources and emissions from international shipping within European seas

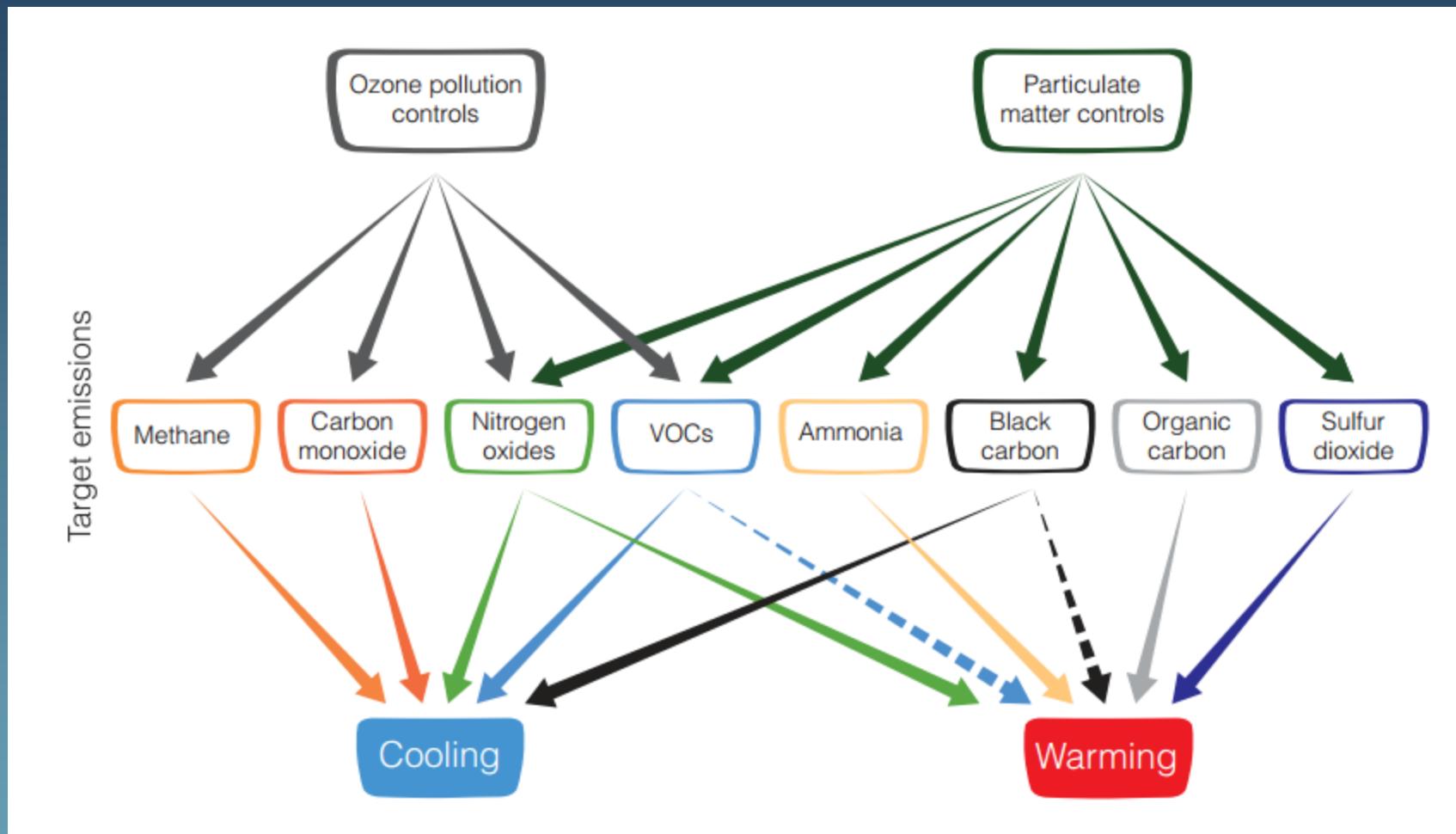
NO<sub>x</sub> emissions in the EU27 and the European seas compared, 2000-2030



# Relative contribution of ship emissions (in %) to annual mean NO<sub>2</sub>, SO<sub>2</sub>, PM<sub>2.5</sub>, and summer daily max O<sub>3</sub>



## Addressing air pollution and impact on climate change (an uncertain dilemma)



IPCC (2013)

European Environment Agency



A consistent, European wide approach for monitoring, reporting and verification of both GHGs and air pollutant emissions from the shipping sector is key to address its contribution to climate change and air quality in tandem.

There is a strong need for further harmonization of emissions information from the shipping sector across Europe. Information from the MRV proposal discussed today can provide better insights in these emissions (direct and indirect when applying data in standard emission calculation methodologies)

Shipping emissions can contribute significantly to local air quality problems in Europe, but the pan-European knowledge and observation base needs to be improved to provide a more complete picture.

It is difficult to assess the trade-off on climate change by reducing cooling air pollutants emission in the shipping sector.



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