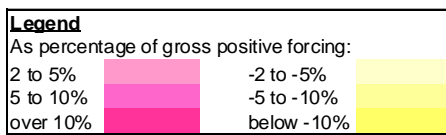


Global Sources of Pollutants, in detail

Contributions of Future Emissions to Year 20 Forcing
(as % of gross positive forcing)



	Carbon Dioxide (CO2)	Nitrous Oxide (N2O)	Methane (CH4)	Ozone (O3)	Black Carbon (BC)	Total (Gross)	Sulfur Dioxide (SO2)	Organic Carbon (OC)	Total (Net)	
Fossil Fuel Combustion										
Industry FF combustion	4%	0%	0%	0%	3%	8%	-7%	0%	0%	} as % of gross: 47% Fossil fuel
Power generation (FF)	9%	0%	0%	0%	0%	9%	-16%	0%	-7%	
Resid. & Comm'l FF combustion	3%	0%	0%	0%	3%	6%	-2%	0%	4%	
Road transport (FF)	4%	0%	0%	1%	4%	10%	-1%	0%	9%	
Non-road land transport (FF)	0%	0%	0%	0%	3%	3%	-1%	0%	3%	
Other FF use	2%	0%	0%	0%	0%	2%	-2%	0%	0%	
Fossil Fuel Production										
FF production (gas, coal, oil, gasoline)	2%	0%	6%	1%	0%	9%	-4%	0%	4%	} 45% Land and food
Land Use & Food Production										
Deforestation	3%	0%	1%	1%	6%	10%	0%	-3%	6%	
Savannah burning	0%	0%	1%	1%	8%	10%	-1%	-4%	5%	
Residential biofuel combust.	0%	0%	1%	1%	5%	8%	-1%	-1%	5%	
Other fires	0%	0%	0%	0%	3%	4%	0%	-1%	3%	
Livestock	0%	2%	5%	0%	0%	7%	0%	0%	7%	
Agriculture	0%	4%	2%	0%	0%	6%	0%	0%	6%	
Human Waste Management										
Human waste management	0%	0%	3%	0%	0%	4%	0%	0%	4%	
Industrial Processes										
Industrial processes (cement, chemicals)	1%	0%	0%	1%	0%	2%	-9%	0%	-7%	
Other										
Other	0%	0%	0%	0%	2%	2%	0%	0%	2%	
Total	30%	6%	19%	8%	38%	100%	-46%	-10%	44%	

↑
data underlying poster pie chart

Policy Implications of Findings

Separate policies for CO₂, methane, black carbon, and ozone precursors are essential:

- **Large near-term contribution** of each pollutant
- **Unique impacts** of short-lived (black carbon, ozone): regional, seasonal
- **Unique roles** of methane as a *near-term* lever and carbon dioxide as a *long-term* lever: linking them in trade reduces ability to independently manage the levers
- **Wide variation in measurability:** different policy instrument types are appropriate
- **Urgency of near-term climate change:** need maximum reduction of each pollutant

Offsets that trade a capped pollutant for a non-capped pollutant should be avoided:

- **Mismatched trade** of well- and poorly-measured emissions
- **Disincentive for regulation of "offset-eligible activities":** regulation requires forfeiture of the offset revenue stream
- **Dilution of environmental outcome** resulting from diminished reductions of capped pollutant and lack of regulations on non-capped pollutants