



Short-Lived Climate Forcers: Black Carbon, Methane, HFCs

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Cherie Saulter, Jesse Libra, Miyako Yerick

Short-Lived Climate Forcers

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GAS	LIFESPANS	REDUCTIONS MtCO ₂ e
BLACK CARBON	3-8 days	4,942 in 2030
METHANE	12 years	1,645 in 2030
HFCs	~13-222 years	76-134,000 in 2050 (cumulative)

Short-Lived Climate Forcers

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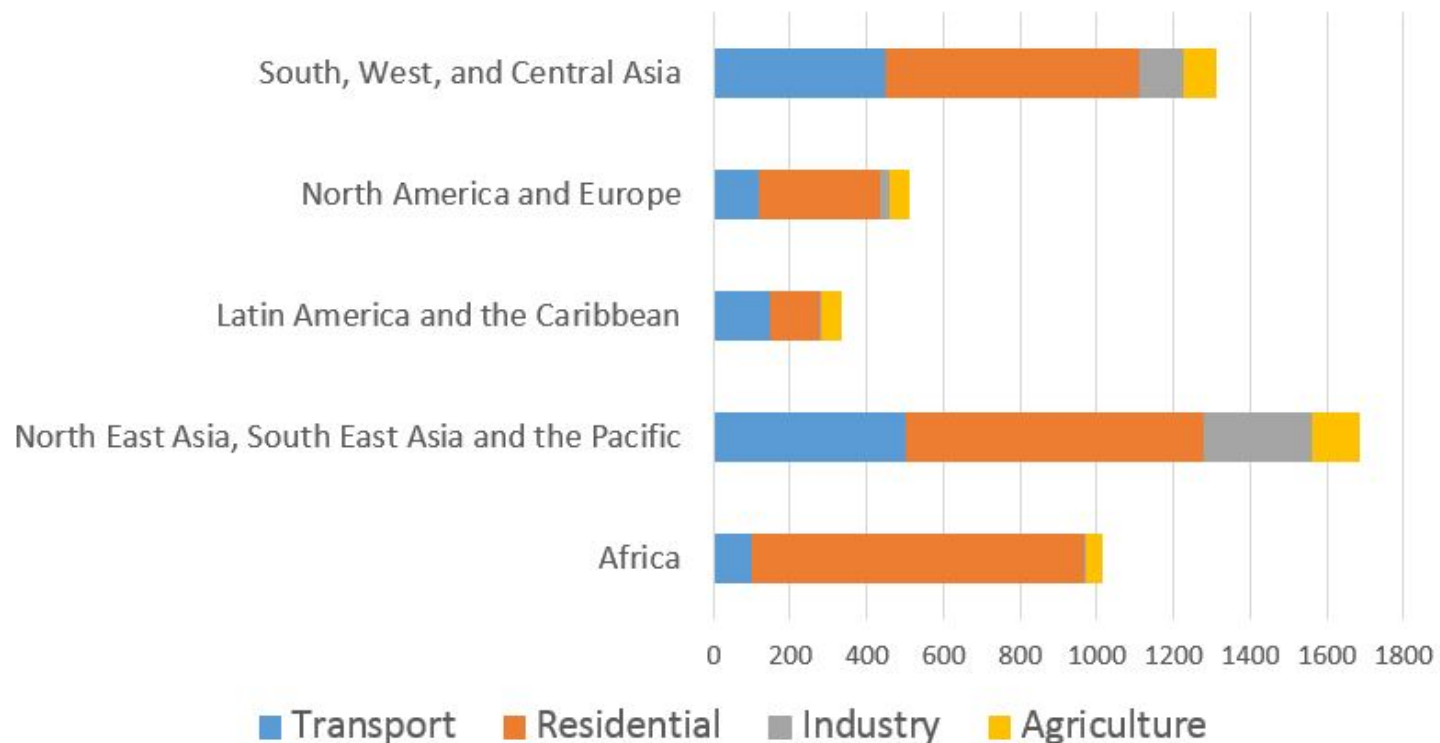
BLACK CARBON	Dissemination and adoption of increased-efficiency biomass-burning cookstoves
	Adoption of diesel vehicle standards and installation of diesel retrofits
	Installation of coke dry quenching technology in coke production
METHANE	Capture of ventilated associated gas during oil and gas production
	Pre-mine degasification and capture of coal-mine methane
	Installation of anaerobic digestion systems
	Aeration of rice paddy fields
	Sorting and treatment of biodegradable municipal waste
HFCS	Adoption of HFC amendment to Montreal protocol
	Replacement of HFCs with CO₂, ammonia, or hydrocarbon refrigeration

SLCF continued - Black Carbon

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- Black Carbon Breakdown

BAU BC emissions by 2030 (kt)



SLCF continued - Black Carbon

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- Residential: Increased-efficiency cookstoves.
- Numbers:
 - Mitigation Potential: 2684 Mt CO₂e assuming 60% adoption.
 - Geographic concentration: Asia (China and India).
- Barriers:
 - high upfront cost.
 - poor market linkages.
 - cultural barriers.
 - non-linear adoption.
- Recommendations:
 - Focus on increased efficiency biomass stoves.
 - Improve market linkages in remote areas.
 - Increase consumer demand through education.



SLCF continued - Black Carbon

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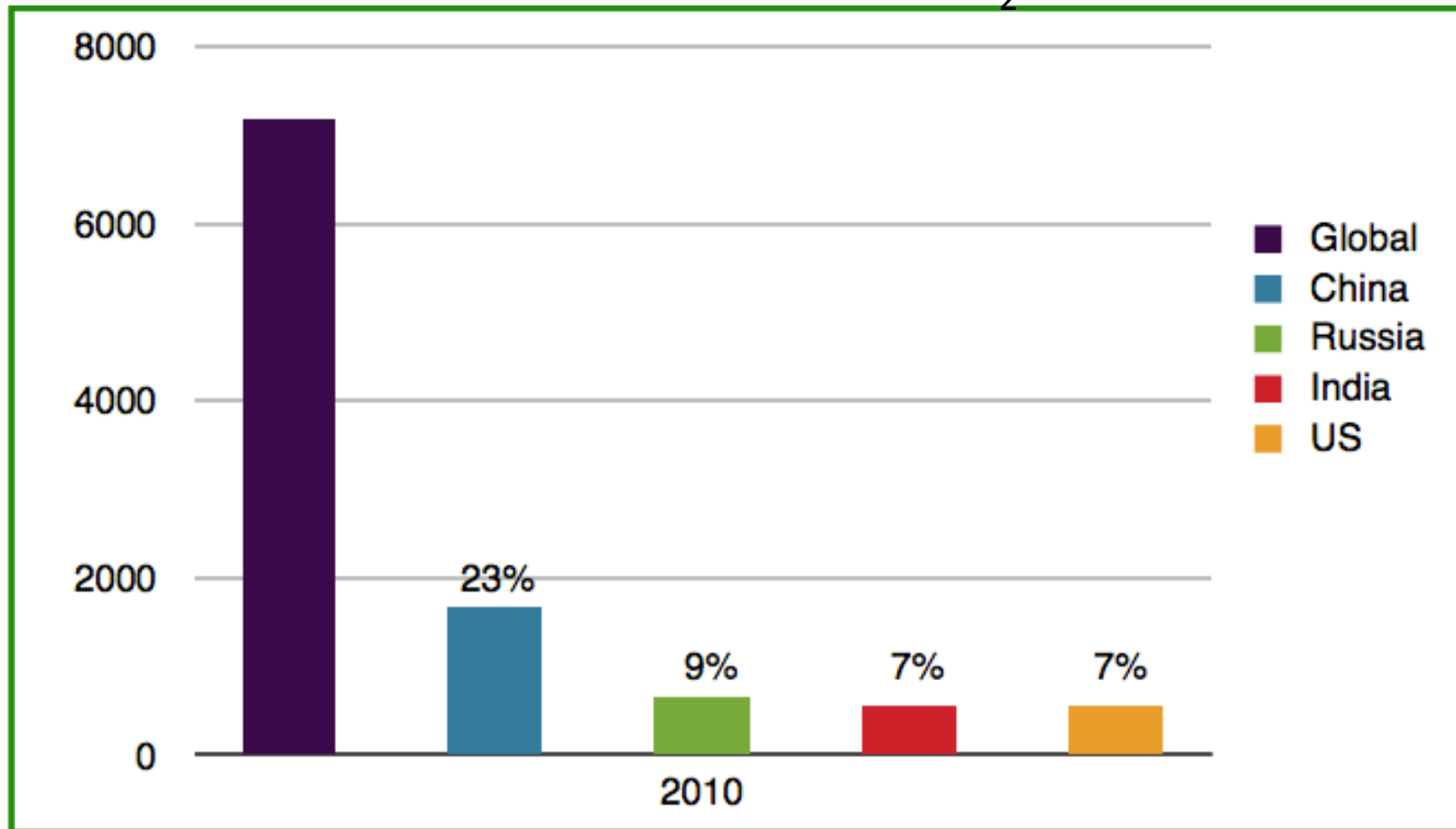
- Transport: Standards and Diesel Particulate Filters.
- Numbers:
 - Mitigation potential: 2060 MtCO₂ eq.
 - Geographic concentration: Global issue, most cities.
- Barriers:
 - Diffuse offenders.
 - Cost.
 - Political will.
- Recommendations:
 - Diesel Particulate Filters over LPG vehicles.
 - Target urban fleets and transport companies.
 - Adopt vehicle standards/improve enforcement.
 - Incentivize replacing older vehicles.



SLCF continued - Methane

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Methane Emissions in MtCO₂e



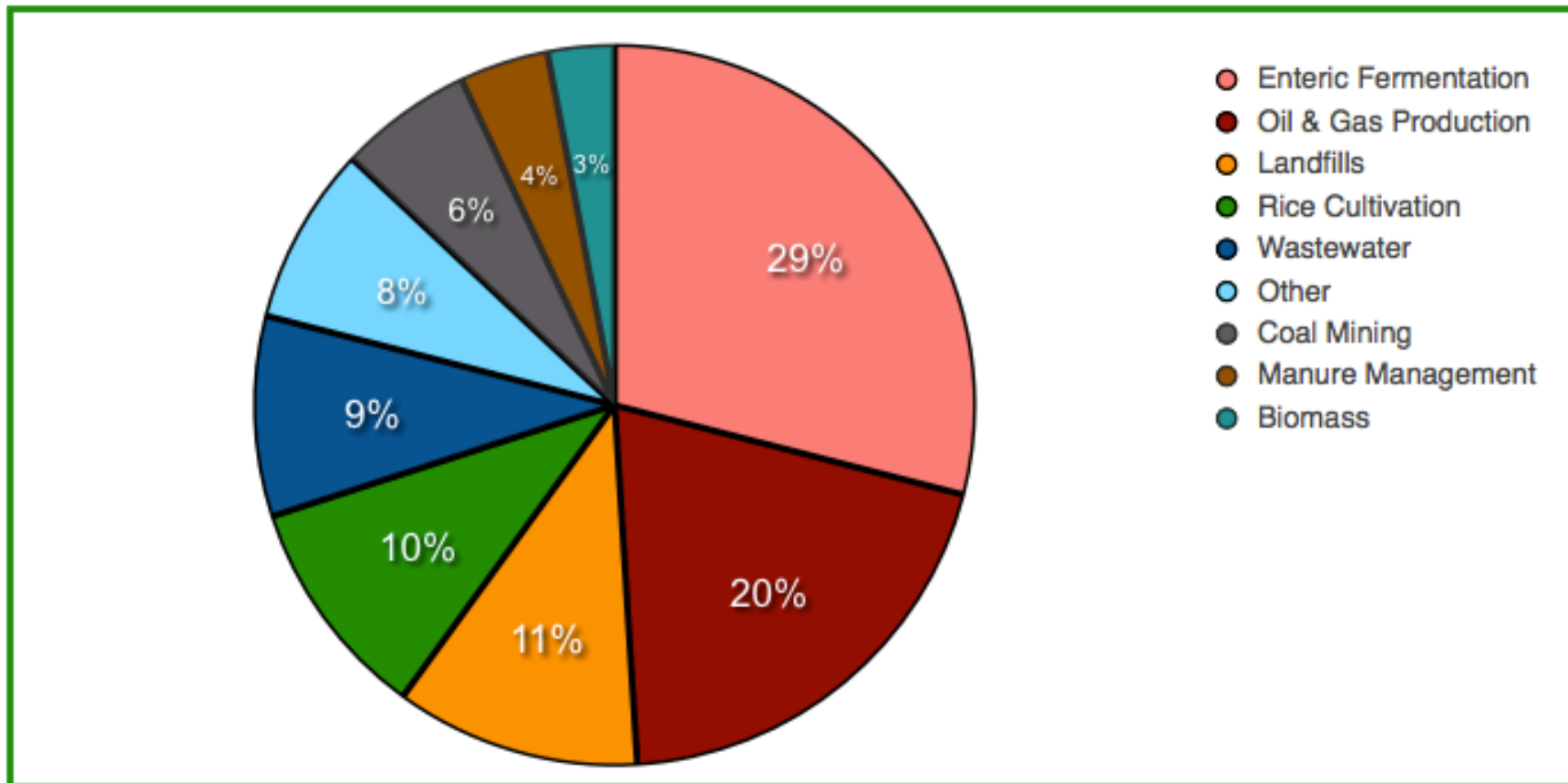
Source: IEA 2010

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SLCF continued - Methane

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METHANE EMISSIONS BY SECTOR (%)



Source: EPA 2011

SLCF continued - Methane

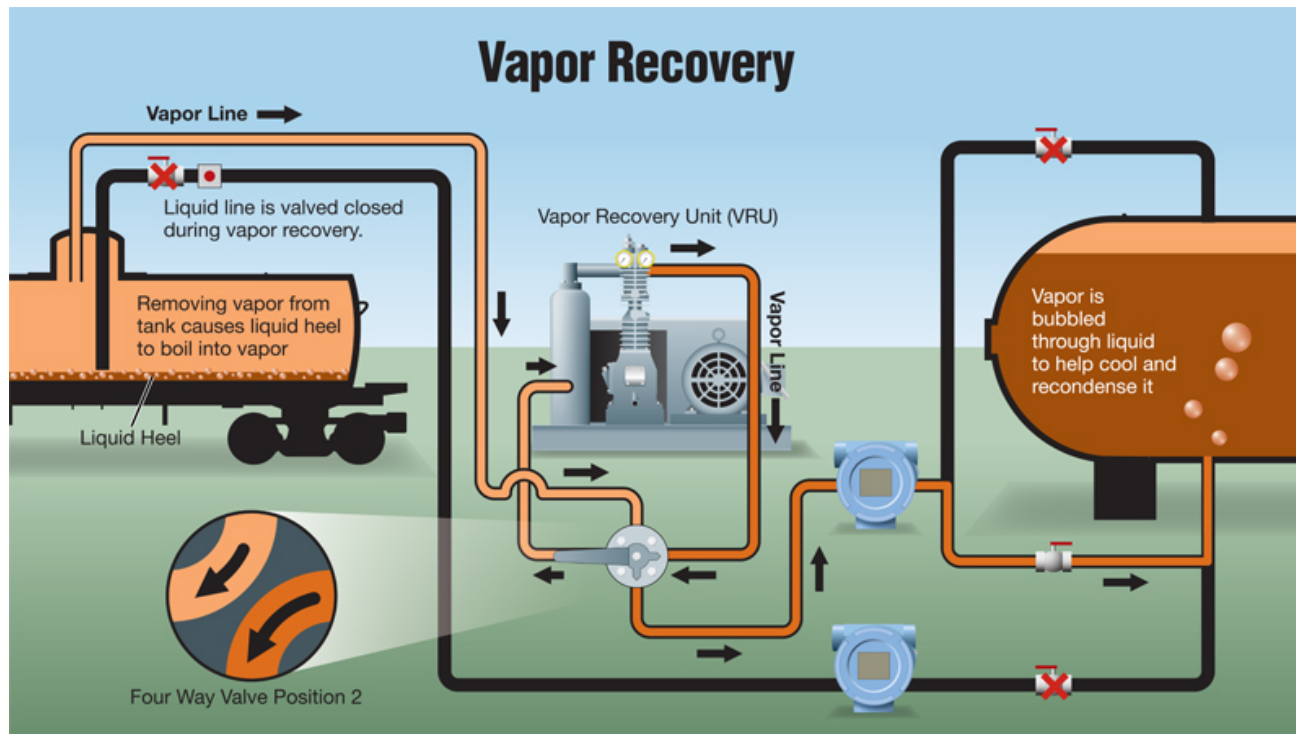
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- Oil and Gas.
- Numbers:
 - Total process emissions from oil and gas production make up 20% of global methane emissions.
 - The emissions reduction potential by 2030 for capture of vented associated gas is 643 MtCO₂e for oil and 50.4 MtCO₂e for gas.
- Barriers:
 - Upfront costs and lack of technical capacity for installing Vapor Recovery Units.

SLCF continued - Methane

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- Recommendations:
 - CDM.
 - Tax rebates/ public financing.
 - Loans from VRU producers.



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SLCF continued - Methane

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- Coal Mining
- Numbers:
 - Coal mining activity is responsible for 6% of global methane emissions.
 - The emissions reduction potential from pre-mine degasification and capture of coal-mine methane in 2030 is 368 MtCO₂e.
- Barriers:
 - China, which emits close to seven times more coal mine methane (CMM) than the next highest emitter, does not have adequate technology for capture, especially of low-concentration CMM.
 - Costs.
- Recommendations:
 - CDM.
 - Capacity building.



SLCF continued - Methane

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- Waste Management
- Numbers:
 - The storage and treatment of municipal solid waste in landfills produces 11% of total global methane emissions.
 - Sorting and treatment of biodegradable municipal waste could potentially reduced emissions by 584 MtCO₂e in 2030.
- Barriers:
 - Political (especially in US).
 - Cultural/behavioral.
- Recommendations:
 - Regulations/rebates.
 - Subsidies for anaerobic digestion systems.



SLCF continued - HFCs

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- HFC Amendment to the Montreal Protocol
- Numbers:
 - 8.8 billion tons of CO₂e per year by 2050.
 - Between 76,000-134,000 MtCO₂e in avoided emissions by 2050.
- Barriers:
 - India.
 - Costs.
- Recommendations:
 - Pressure from China and other developing countries for India to sign.
 - Financial assistance for Article 5 countries.

SLCF continued - Conclusion

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- Environmental and health benefits.
- Potential for immediate payoffs in abated emissions make SLCFs an attractive area for action on climate change.
- Buys time for CO₂ mitigation to become economically and politically viable.