Value of conventional pollutant controls to achieving climate goals

California actions on black carbon

- Diesel Risk Reduction Plan
- LEV III recognition of black carbon climate warming
- Comprehensive statewide black carbon emissions inventory
- State-of-the-art black carbon vehicle emissions testing in El Monte
- Highly targeted and effective research program
Key SLCP features of LEV III

- Significant precedent set by 1 mg/mi PM standard for passenger cars
- Lengthy Appendix acknowledging the climate warming impacts of black carbon
- Important extension of credits for low GWP refrigerant and low leak systems
Recognizing the impact of short-lived climate pollutants on near-term climate change, agricultural productivity, and human health, we support, as a means of promoting increased ambition and complementary to other CO2 and GHG emission reduction efforts, comprehensive actions to reduce these pollutants, which, according to UNEP and others, account for over thirty percent of near-term global warming as well as 2 million premature deaths a year…
## UNEP’s List of 17 Promising Measures

<table>
<thead>
<tr>
<th>Methane measures</th>
<th>BC - technical</th>
<th>BC - Non-technical</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Production of crude oil and natural gas</td>
<td>2. Modern brick kilns</td>
<td>2. Ban open burning of agricultural waste</td>
</tr>
<tr>
<td>5. Wastewater treatment</td>
<td>5. Improved biomass cook stoves</td>
<td></td>
</tr>
<tr>
<td>6. Farm-scale anaerobic digestion</td>
<td>6. Pellets stoves and boilers</td>
<td></td>
</tr>
<tr>
<td>7. Aeration of rice paddies</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Methane measures**

- Recovery of coal mine gas
- Production of crude oil and natural gas
- Gas leakages at pipelines and distribution nets
- Waste recycling
- Wastewater treatment
- Farm-scale anaerobic digestion
- Aeration of rice paddies
UNEP’s “High Five”

- Fast action on diesel emissions [BC]
- Upgrading old inefficient brick kilns [BC]
- Accelerating reduction of methane from landfills [CH$_4$]
- Speeding cuts of methane and black carbon emissions from oil and gas industry [CH$_4$+BC]
- Accelerating alternatives to HFCs [HFCs]
Challenges with HFC controls in EU mobile sector

- EU Commission has delayed enforcement of MAC rule by two years to Dec 2012
- EU courts have rejected patent claim of Honeywell and Dupont over HFO-1234yf
- Some European citizens and environmental groups remain concerned about flammability and toxicity, and they favor CO$_2$
- Automakers generally remain committed to using HFO-1234yf
Lessons for US MAC Policy

- Crediting system is the better approach in light of uncertainties in global refrigerant supply
- Alternatives to HFO-1234yf may be increasingly important
  - US EPA has not issued “unique fitting” rule that permits CO$_2$ systems despite SNAP approval and their lower lifecycle cost
Global mitigation potential from alternative MAC systems

![Graph showing refrigerant emissions over time, comparing baseline and alternative MAC systems. The graph indicates a significant reduction in emissions with the use of alternative MAC systems compared to baseline.]

- Blue line: Baseline
- Red line: 100% HFO-1234yf
- Purple line: 100% HFC-152a
- Dotted black line: 100% R-744 (CO₂)
Projected lifecycle costs of alternative MAC systems in 2025

The bar chart compares the lifecycle costs of different MAC systems across various regions and the global average. The costs are measured in $/mtCO₂e and are differentiated by the use of HFO-1234yf, HFC-152a, and R-744 (CO₂) as refrigerants.

- **United States**: HFO-1234yf is the most expensive, followed by R-744 (CO₂) and then HFC-152a.
- **EU-27**: Similar trend as the United States, with HFO-1234yf being the most costly.
- **China**: HFC-152a is the least expensive, followed by R-744 (CO₂) and HFO-1234yf.
- **India**: HFO-1234yf is the most expensive, followed by R-744 (CO₂) and then HFC-152a.
- **Mexico**: Similar to India, with HFO-1234yf being the most costly.
- **Brazil**: Similar to India, with HFO-1234yf being the most costly.
- **Global Average**: HFO-1234yf is the most expensive, followed by R-744 (CO₂) and then HFC-152a.
Review authority under AB 32 to address SLCPs and take appropriate actions

- Report and verify statewide emissions, and account for:
  - The full net climate effect SLCPs
  - Differences in impact by region.
  - Differences in impact by source.
  - Both near-term and long-term climate impacts, including multiple time horizons for CO₂-equivalent metrics.
- Identify statewide greenhouse gas emissions targets for 2020 that include SLCPs and maintain existing stringency on GHGs
- Update plan for achieving maximum technology feasible and cost-effective reductions and take account of SLCP measures
- Keep SLCPs out of market-based mechanisms
Conclusions

1. Stay committed to CO$_2$, and treat SLCPs as complementary
2. Adopt explicit goals to limit the “rate of climate change” and “near-term climate impacts”
3. Include SLCPs in the statewide GHG inventory and AB32 planning process
4. Review existing regulations that reduce SLCPs and quantify their climate co-benefits
5. Undertake an assessment of uncontrolled statewide sources of SLCPs
6. Identify maximum avoidable cost-effective emission reduction measures for uncontrolled sources
7. Prioritize or speed up strategies that can be rapidly implemented
   - Consider more rapid phase-in of 1 mg/mi LEV III PM standard
8. Marine black carbon demo at major port