

Work Plan – Semiconductor Sector (PFCs)

The Semiconductor Industry Association has a Memorandum of Understanding (MOU) with the United States Environmental Protection Agency to voluntarily reduce PFC emissions by 10% below 1995 baseline levels by 2010. This agreement is also part of a broader global effort on the part of the World Semiconductor Council (WSC) to reduce PFC emissions globally by 2010. The industry's climate protection plan includes the following elements:

Element 1: Emission measurement and reporting protocols

Measurement and reporting protocols were created and revised periodically in accordance with the MOU and the global agreements. Participating U.S. companies report PFC emissions annually to EPA by way of a third party as described in the MOU. EPA's partner companies and WSC members use Tier 2 PFC emission measurement and reporting protocols in accordance with the Intergovernmental Panel on Climate Change's (IPCC's) Good Practice Guidance for National GHG Inventories, Chapter 3.6 (www.ipcc-nggip.iges.or.jp/public/gp/gpgaum.htm). International industry and government experts met in July 2004 to begin updating the IPCC's GHG inventory guidance. The IPCC Lead Authors will meet again in July 2005 to prepare the document and address comments from expert reviewers prior to publication in 2006.

Element 2: Identify/implement near-term, cost-effective opportunities

The Semiconductor Industry Association (SIA) identifies near-term, cost-effective opportunities through sharing of technical information with other associations, technical conferences with chemical and equipment suppliers, and information developed through research consortia such as International SEMATECH and the NSF/SRC Engineering Research Center for Environmentally Benign Semiconductor Manufacturing.

Opportunities identified and implemented to date include:

- Alternative chamber cleaning PFC gases and process recipes that reduce input gas costs as well as GHG emissions,
- Improved process end point detection to more accurately determine when to end PFC gas flow and cut power and,
- NF₃ based chamber cleaning technologies that have reduced PFC emissions by greater than 95% compared to traditional process recipes.

In addition to the adoption of new technologies, SIA, its partner companies and EPA will work together to facilitate data collection and to improve data quality. The SIA and EPA will meet annually to discuss PFC emission reduction technologies and progress towards the reduction goal at the International Semiconductor Environment, Safety and Health conference typically held in July.

Element 3: Develop cross-sector projects for reducing greenhouse gas emission intensity

The Semiconductor Industry Association's strategy includes cross-sector projects with global chip manufacturers, tool suppliers, chemical suppliers, abatement equipment suppliers, and research consortia. The semiconductor industry and its suppliers have and will continue to seek solutions in cooperation with similar electronic industry sectors. Current activities include supporting the revision of the IPCC GHG inventory guidelines which began in July 2004, and is expected to be completed in 2006.

Element 4: Accelerate investment in R&D and commercialization of advanced technology to achieve the goal of reducing PFC emissions by 10% below the 1995 baseline level by 2010.

A key element of the Semiconductor Industry Association work plan to reduce PFC emissions is support of programs to advance R&D funding and commercialization of advanced technology. The industry's ongoing R&D initiative will continue investigating new materials and technologies that are expected to significantly reduce PFC emissions from the most technically challenging sources. For example, alternative plasma etch processes that reduce or eliminate GHG emissions have tremendous potential to help the industry achieve its climate protection goal and are preferred when guided by a pollution prevention hierarchy. Further down the production process, energy efficient abatement technologies such as those using plasmas or catalytic oxidation to destroy PFC gases, are expected to have an important role in the industry's climate protection technology "tool box."

EPA's semiconductor partnership will complete a report by 2006 to assess the state of emission reduction technologies, identify any barriers, and specify additional R&D needs to achieve the 2010 reduction goal. Once completed, the partnership's report will be available on **EPA's PFC Reduction/Climate Partnership** [LINK to www.epa.gov/semiconductor-pfc] and the Climate VISION web sites.