

Piloting Addressing Broader Environmental Objectives through the ENERGY STAR Program - Addressing Greenhouse Gas Emissions from LCD Manufacture

Context:

EPA is initiating a discussion with stakeholders to explore ways in which the ENERGY STAR Program might address product attributes such as life cycle energy use and other environmental characteristics (e.g., reduced toxins) so as to ensure that products that display the ENERGY STAR label continue to meet consumer expectations.

EPA/OAR has identified two paths forward for a pilot focused on computers/monitors and is initiating discussions with stakeholders regarding testing or piloting approaches to addressing broader environmental objectives through the ENERGY STAR program. The first proposed approach is to require that ENERGY STAR qualified products also reduce embodied energy and toxins, for example. The second possible approach is to highlight products that meet ENERGY STAR plus other environmental requirements on line or possibly with a differentiated product designation (i.e., label).

Any path would likely use as a foundation the below background and analysis discussed briefly at a previous Display Stakeholder meeting. Thus, EPA is sharing the information below and expects to discuss this document in the context of the display pilot. Next steps are noted at the close of this document.

Background:

Recently there has been increased attention in the media on both high global warming potential fluorinated greenhouse gases (F-GHGs) – such as nitrogen trifluoride (NF₃) – as well as the lifecycle carbon footprint of products. EPA's expertise in working with electronics manufacturers to cost effectively reduce F-GHG emissions through voluntary partnerships in the U.S. and internationally via the World LCD Industry Cooperation Committee (WLICC) provides the groundwork for expanding cooperative climate protection efforts. As EPA's ENERGY STAR program looks for ways to increase energy efficiency of products, this area of concern presents an opportunity to significantly reduce emissions beyond the products use-phase and to engage our partners in achieving significant, measurable climate benefits throughout the products' complete lifecycle.

The production of liquid crystal displays (LCDs) for use in monitors and TVs is growing significantly. LCD manufacturers, similar to semiconductor and photovoltaic cell producers, use F-GHGs to clean chemical vapor deposition chambers and plasma etch silicon containing materials. Current global LCD production capacity is 88.7 million square meters compared to 11.7 million square meters in 2001. In 2003, LCD manufacturers in Taiwan, Japan and Korea launched a voluntary initiative through the WLICC to set aggressive F-GHG emission reduction goals for 2010. These countries currently produce roughly 96% of the world's LCDs. Using current F-GHG control technologies, LCD manufacturers can reduce emissions such as sulfur hexafluoride (SF₆), nitrogen trifluoride (NF₃), and tetrafluoromethane (CF₄) by more than 90 percent for.

Reduction potential:

LCD manufacturers have started implementing control technologies that reduces the emissions of greenhouse gases by 90%. Based on current US shipments of monitors, the greenhouse gas emissions that could be prevented by employing these technologies in the manufacture of LCDs is equivalent to about 0.36 MMTC, nearly 3 billion pounds of CO₂.

These savings figures are for the US only and most certainly would be greater worldwide, since ENERGY STAR has international agreements with several countries for specifications relevant to office equipment. In addition the monitor specification is currently being expanded to include other displays such as digital picture frames and professional displays.

Opportunity for ENERGY STAR:

To date, ENERGY STAR has focused on the energy consumed during the use of products, as this has represented the greatest opportunity for energy savings. However as ENERGY STAR transforms the market, manufacturers are continuously looking for ways to reduce the GHG emissions associated with their products to continue to achieve recognition as top performers in energy efficiency.

ENERGY STAR is currently reevaluating the specification for displays because of the high market penetration and plans to specify more stringent levels for qualification. As manufacturers look for opportunities to continue to drive down the carbon emissions associated with their products, ENERGY STAR is interested in promoting those opportunities that offer significant reductions in greenhouse gas emissions. In the context of a pilot, EPA could propose limiting the emissions associated with LCD panels by either requiring the use of control technologies or by setting a limit on the amount of emissions per area of LCD panels produced. Alternatively, EPA could recognize products that meet this new requirement as well as the forthcoming ENERGY STAR Display requirements that focus on curbing use phase energy. In either scenario, manufacturers would be responsible for working with their suppliers to track these emissions for LCD panels used in ENERGY STAR displays.

EPA is currently working with the WLICC to develop a protocol for accurately measuring controlled F-GHG emissions from facilities. Since this protocol is new and most manufacturers are using the Intergovernmental Panel on Climate Change (IPCC) emissions estimating methods to report emissions from LCD manufacture, an approach that requires the use of control technology is presently more practical. As electronics manufacturers become familiar with and adopt the new measurement protocol, ENERGY STAR may be able to move to a requirement that limits the total amount of GHG emissions per unit surface area of LCD substrate.

Next Steps:

ENERGY STAR is exploring the opportunity to control F-GHG emissions from LCD manufacturing by working with display and television producers and their suppliers to discuss options for incorporating requirements into future ENERGY STAR specifications or highlighting products that have this additional life cycle benefit. EPA/OAR anticipates inviting interested stakeholders to participate in a series of discussions regarding structure, requirements, and recognition (i.e., web recognition vs new label) of a display/computer pilot beginning in early December and continuing through the first quarter of 2009 with the aim of launching a pilot no later than April 2009.