# SHPP's Inputs to the Public Consultation Comments to Annex XV PFAS Restriction Proposal

# Question number 6: Missing uses: PTFE Used as an Anti-Drip Additive in Flame Retardant Polycarbonate Resins and Blends for Photovoltaic Devices

## Executive Summary

SABIC's Specialties business (SHPP) produces a range of highly differentiated products, including high-performance thermoplastics, compounds, and additives that meet complex thermal, mechanical, optical, and electrical property requirements.

Flame retardant polycarbonate (FR PC) resins and blends with Polytetrafluoroethylene (PTFE) anti-drip additives play a safety-critical role while providing functionality in photovoltaic applications such as connectors, junction boxes, and inverters. These FR PC resins and blends used in such applications are inherently tough materials in harsh environments and provide device integrity, especially during cold temperature impact events and maintenance activities, so the device continues to function, and does not produce an electrical hazard (short circuit, shock hazard) or a fire hazard. Because these plastics are inherent insulators, they also provide a needed significant reduction in electrical shock resistance when used in these high-voltage applications. By increasing ignition resistance, the PTFE used in FR PC resins and blends helps prevent injuries and property damage by lowering the probability of a fire event. If a flame event does occur, they help prevent the loss of life and property by reducing the risk of a small fire growing out of control.

All the safety and functionality advantages must be maintained over time in the outdoor environment. This environment requires UV and water/moisture resistance, and property retention over a wide range of temperatures, including resistance to cold temperature impact and maintaining ductility. The specific devices where these FR PC resins and blends with PTFE anti-drip additives are used (for example, connectors, inverters, and junction boxes) all see high voltages. A failure of any one of these devices at least would compromise the PV system functionality but could also lead to immediate fire hazards and immediate or hidden shock hazards to anyone interacting with the system – maintenance, repair, adjacent activities, etc.

Emissions of PTFE during the use phase of final products are negligible because PTFE is bound within the PC resins and blends. The emissions in the waste stage depend on the pre-treatment method. A recent review published by the Society of Environmental Toxicology and Chemistry (SETAC) in 2023 shows that PTFE does not release substances of toxicological or environmental concern, and fluoropolymers are stable and not expected to transform to dispersive nonpolymeric PFAS.

SHPP's extensive research has not found any alternatives that provide adequate flammability performance for FR PC resins and blends while also maintaining adequate impact resistance and ductility, cold temperature impact retention, weatherability, and electrical tracking resistance.

If an alternative is found, material qualification testing will be needed, companies may need to make changes to their manufacturing equipment and processes to use the new material, and part qualification testing would be needed. Given the absence of alternatives, SHPP feels it would be appropriate to allow for a 12-year derogation to have sufficient time to invent new materials or develop viable alternatives for PTFE used as an anti-drip additive in flame retardant polycarbonate resins and blends, and to have sufficient time for the steps needed to make and qualify final parts.

**Substance Information**

**Substance Name:** Poly(1,1,2,2-tetrafluoroethylene)
**Synonyms/Abbreviations:** PTFE
**Molecular formula:** $(C_2F_4)_n$
**EC/List no.:** 618-337-2
**CAS number:** 9002-84-0
**Type**: Solid
**Application**: PTFE used as an anti-drip additive in flame retardant polycarbonate (FR PC) resins and blends for photovoltaic applications