Joint statement on the

Revision of the F-Gas Regulation

Introduction

As critical building block of Europe's digital economy, the semiconductor industry places environmental sustainability and protection as highest priority in every facet of business. We strive to build a resilient, green future by developing innovative components and systems that help Europe's most critical industries such as automotive, medical, aerospace and defence, deliver sustainable technology solutions to resolve our region's most pressing issues and advance environmental stewardship across fast-growing global markets.

Moreover, The European semiconductor manufacturing industry is a very minor contributor to overall greenhouse gas (GHG) emissions in Europe. The sector does emit some GHG (F-gases) during its manufacturing process, however, it remains very committed to continue to manage these emissions.

The European semiconductor industry has reduced its PFC (perfluorinated compounds) emissions through commitments and financial investments of individual companies. The use PFC gases (including perfluorocarbons HFCs, SF6, NF3) in manufacturing remains critical to the production of semiconductor chips, as there are no effective substitutes that can be utilised for the etching and cleaning of chemical vapour deposition chambers. The criticality of the process technologies in semiconductor manufacture relates to the complete basket of the PFC compounds used. The semiconductor industry employs a hierarchy in the development of PFC emission reductions. This is structured around the pollution prevention concepts of **reduce**, **replace**, and **abate**.

These development areas are:

- **Process optimisation** - reduces the amount of PFCs that are used and emitted.
- **Using alternative processing PFC chemistries with lower GWP** – reduces or eliminates emissions (example: Introduction of highly efficient NF_3 remote plasma processes of C_2F_6 and CF_4).
- **Installation of abatement equipment**– reduces or eliminates emissions.

I. Use of fluorinated gases in the semiconductor industry

The semiconductor industry's use of fluorinated gases can broadly be divided into two distinct categories – (1) process chemistries used in several of the numerous steps of the semiconductor manufacturing process (see figure 1) and (2) low temperature process equipment chillers (see figure 2).

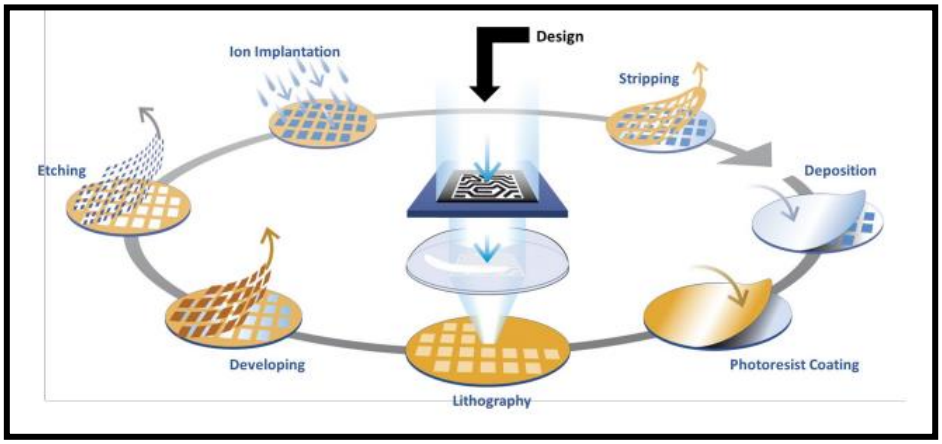


Figure 1: Key steps in the semiconductor manufacturing process

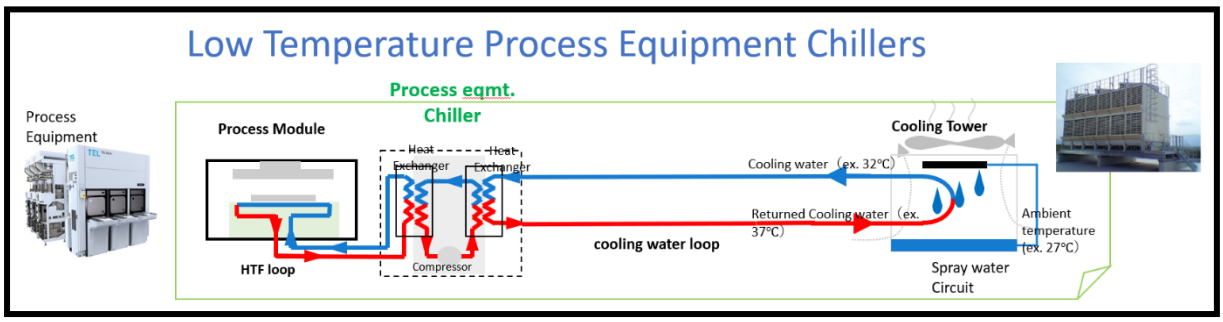


Figure 2: Equipment chillers in the semiconductor manufacturing process

II. The F-Gas Regulation and proposed amendments

Market prohibitions and quota exemption (Article 11, 16 and Annex IV)

The ENVI committee proposes to replace the exemption of semiconductor materials and vapour deposition chambers from the quota system for F-Gases and to empower the Commission to implement a temporary exemption. Such an approach creates an unacceptably high risk of disrupting supply chains and adds an unnecessary layer of bureaucracy for the world-wide suppliers of semiconductor manufacturing systems and manufacturers of semiconductor products.

The removal of the semiconductor industry exemption from the quota system would eventually make it impossible for semiconductor companies to acquire HFCs that they need to manufacture in Europe. As there is currently no alternative process technology this will ultimately threaten the viability of the semiconductor industry in the EU and the goals of the EU Chips Act.

Control of use (Article 13)

Ongoing servicing and maintenance of existing semiconductor manufacturing systems is also a critical concern. Removal of the 40t GWP equivalent charge size exemption for servicing and maintenance, the phasing out the use of F-Gas with >150 GWP for servicing and maintenance by 2030 and prohibiting the supply of spare parts within 10 years of placing on the market would result in excessive early obsolescence with no benefit to the goals of the EU climate goals. The refrigeration and air conditioning equipment are an integral part of the design of the semiconductor manufacturing systems making it very challenging, very expensive and sometimes impossible to redesign the equipment. Manufactures of both semiconductor device products in the EU will incur significant costs to replace equipment half-way through its service life.

We recognize that the ENVI proposal has included a servicing exemption for chillers in article 13 but there is no definition of 'chiller' in the Commission text, Presidency compromise text, ITRE amendments or ENVI amendments.

The ENVI proposal prohibits the servicing of air conditioning and refrigeration equipment using F-Gas with GWP >2500 from 2024 with an exemption for applications designed to cool medicinal products to below -50C. The manufacture of semiconductor devices is critically dependent on applications designed to cool the silicon wafers to below -50C. Removing the general servicing exemption for applications designed to cool products to below -50C will be catastrophic for the European semiconductor industry.

Definitions (Article 3)

Within the Commission proposal and the proposed ENVI amendments there is lack of clarity on the definitions for the different types of refrigeration and air conditioning equipment. It is essential that the definitions are uniquely understood to allow identification of the equipment types impacted by the control of use restrictions and market prohibitions.

The Presidency proposal and the ITRE amendments addresses some of these concerns but still leaves uncertainty, particularly the definition of 'self-contained'.

The refrigeration and air conditioning equipment for semiconductor manufacturing systems meet the ENVI and Presidency text definition of 'stationary self-contained' and 'stationary' resulting in lack of clarity and contradictory interpretation of the requirements.

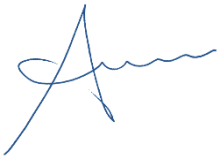
III. Policy implications of proposed amendments

Currently, the EU relies quite heavily on imports of semiconductor products from countries in other regions around the world (mainly China, Taiwan, Japan, South Korea, and the United States). The aim of policies such as the EU Chips Act and the Critical Raw Materials Act is to decrease the reliance on other parts of the world and become

more self-sufficient and resilient to supply chain disruptions. In that context, the EU has set itself the target of increasing its global market share in the semiconductor production from 10% to 20%. SEMI and ESIA welcome this ambitious goal.

However, proposals such as the Parliament's one to remove the exclusion of the semiconductor industry from the HFC quota system would put the European semiconductor ecosystem at a significant competitive disadvantage with other regions, where such restrictions do not exist. Given the very high investment costs and long planning periods for semiconductor fabrication plants, the semiconductor industry needs long-term investment certainty. The inclusion in the quota system would limit the availability of HFCs required for semiconductor manufacturing and ultimately make it impossible to achieve the EU's goals.

SEMI and ESIA request that the EU Parliament rejects the current ENVI proposals to allow time to consider the critical challenges created by the zero baseline/exemption-based approach, the contradictory interpretation created by lack of equipment definitions and the huge financial impact to the European semiconductor industry resulting from the premature obsolescence of refrigeration and air conditioning equipment.



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