



**Circularity for Photovoltaic industry use of Hydrofluoric (HF) acid**

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# We are Solvay

**We are Solvay**, a pioneering chemical company with a legacy rooted in the groundbreaking soda ash process innovation of our founder Ernest Solvay. **We are essential chemistry** – neither commodity nor specialty... essentials.

**Making progress possible** has been in our DNA since 1863. We master industrial processes to better manufacture technologies that are essential to multiple markets, just as we commit to social progress for our employees and communities.

Our products are **essential to people's daily lives**—purifying the air we breathe, conserving food resources, protecting health and well-being, making car tires more sustainable, enabling battery recycling, and high-performance semiconductor chip manufacturing.

A **reference player** in all our markets, with sustainability and excellence embedded in our operations and values, we are committed to driving the transition toward a **carbon-neutral future** by 2050, and creating a sustainable impact **for generations**.



~9,000

Employees



€4.7bn

Underlying  
net sales



€1.05bn

Underlying  
EBITDA



44

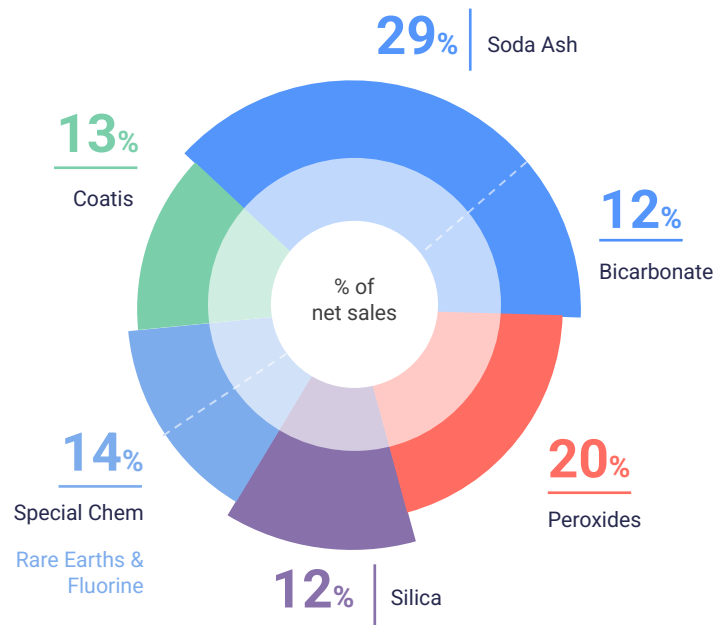
Production  
sites



41

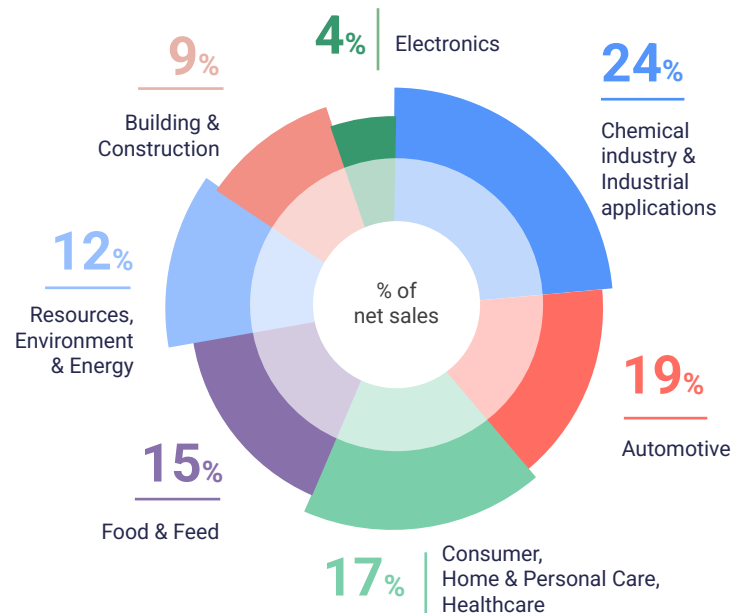
Countries

## Focused portfolio of leading businesses



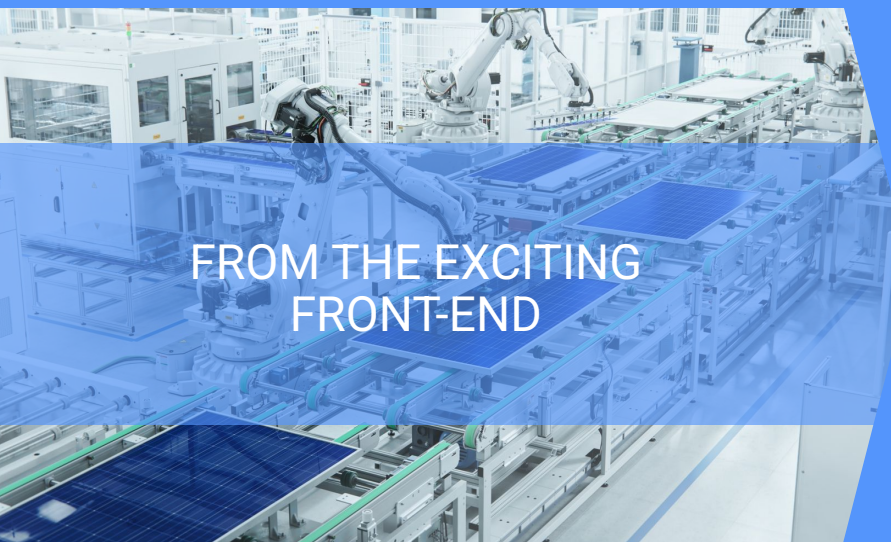
2024 figures

## Essential to diversified end-markets



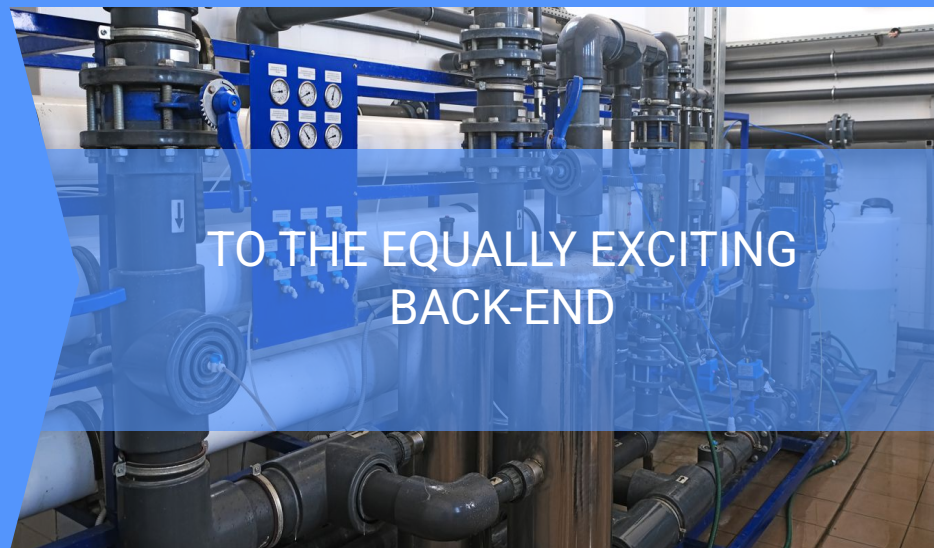
**SOLVAY**

# Let's go on a journey



FROM THE EXCITING  
FRONT-END

**Processing / Production  
of Photovoltaic cells**



TO THE EQUALLY EXCITING  
BACK-END

**Wastewater treatment plant**

# Defining Success in Photovoltaic Manufacturing

*From Front-end processing/production of Photovoltaic cells to Back-end wastewater treatment plant*

Processing / Production of Photovoltaic Cells						Wastewater Treatment Plant		
Success criteria						Success criteria		
Yield of process	Efficiency of Photovoltaic cells	Technology leadership	Production plant size in GW	Customer contract duration	Financial metrics	Least expensive option?	Minimum regulatory requirements met?	How quickly can I stop thinking about this?
Process Raw materials critical for production						These same raw materials used for processing		
Hydrofluoric Acid	Hydrochloric Acid	Sulfuric Acid	Hydrogen Peroxide	Nitric Acid	Others	Treated with intent of disposal	Other materials to neutralize selected waste streams	Resources, people, and partners to manage and dispose of the resulting waste streams

But first:

What is the function of these raw materials in Photovoltaic cell manufacture?

## FLUORIDES

**Hydrofluoric Acid** (*electronic grade*) is used for:

- ✓ **Silicon wafer etching** – oxide removal, texturing, and wafer edge treatment
- ✓ **Cleaning and contaminant removal** – of metallic and organic contaminants from silicon surface

## PEROXIDES

**Peroxides** (*incl Hydrogen Peroxide*) are used for:

- ✓ **Cleaning and surface preparation** - oxidize and remove organic residues (oils, greases, photoresist residue)
- ✓ **Etching** - texturing silicon surface (pyramidal surface)
- ✓ **Surface passivation and oxide growth** - protection of silicon surface from degradation

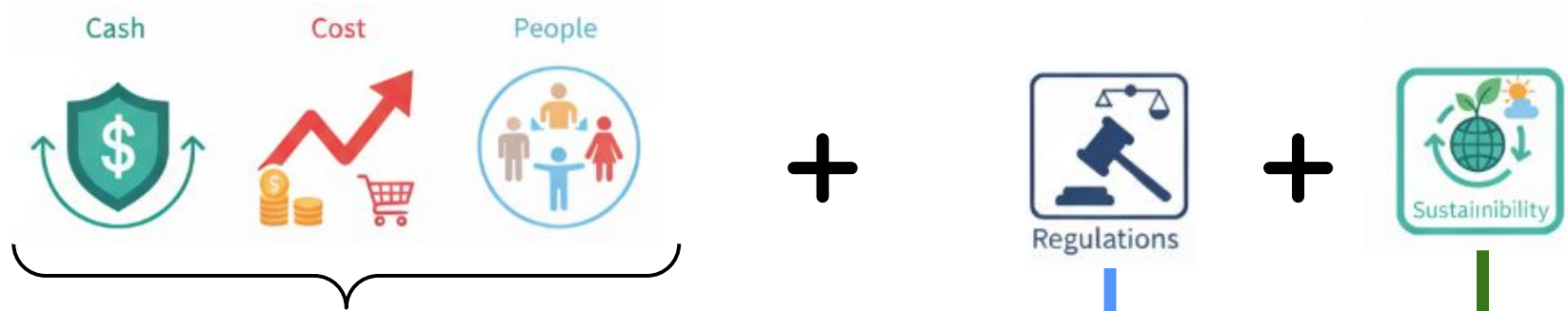
## OTHER ACIDS

**Nitric acid, Hydrochloric acid, Sulfuric acid, others** are used for:

- ✓ **Etching** – often combined with HF for etching, and for removing saw damage from silicon wafers.
- ✓ **Cleaning and contaminant removal** – of metallic impurities from silicon surface



# Why Circularity Matters?



## **The acids profiled are neutralized before disposal**

Requiring upfront Capex spend in addition to ongoing costs related to materials and energy, plus people resources and partners for such disposal.

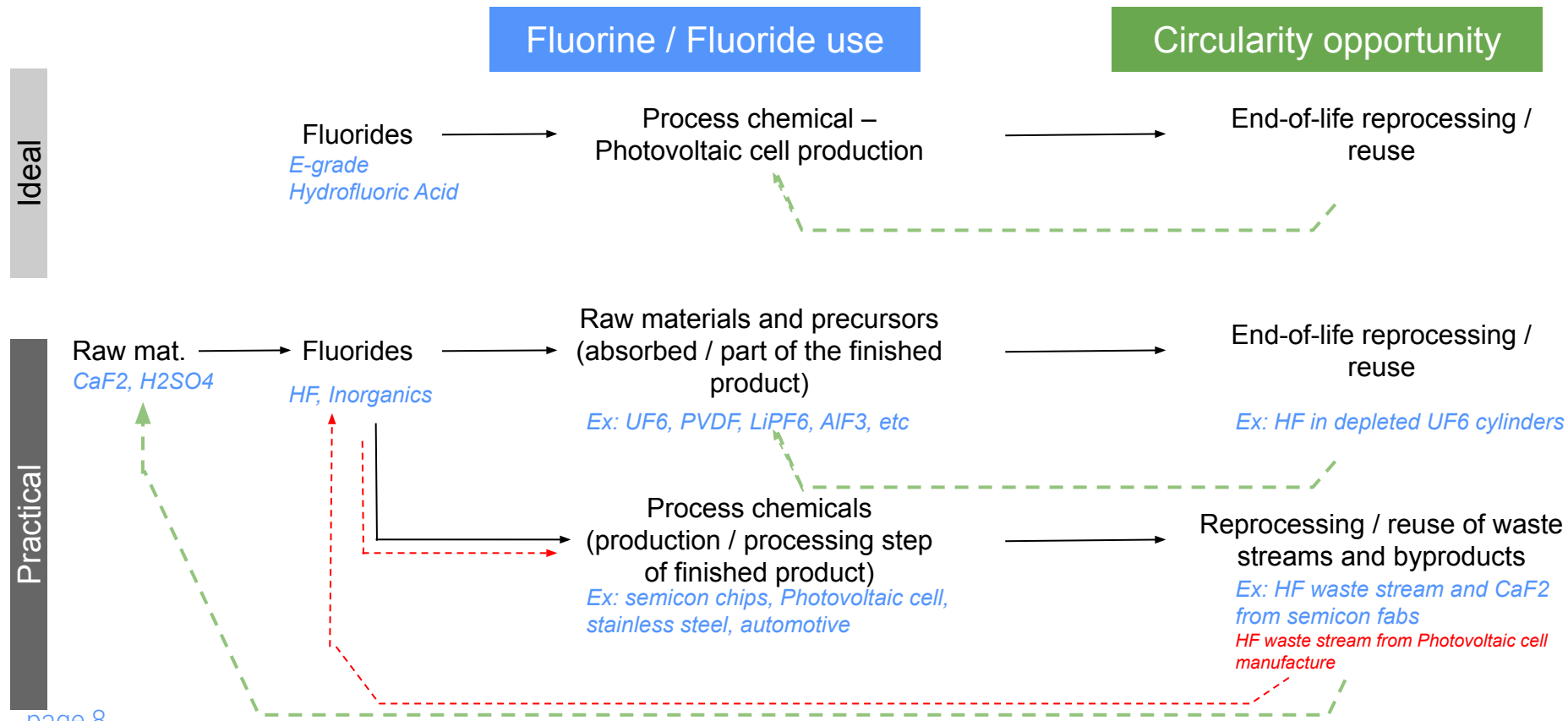
**Increased focus on fluorides in wastewater may lower acceptable levels.** This will require additional processing or expense depending on local regulatory focus (state EPA, local municipality limits).

**Recovery of such materials boosts the sustainability image of the Photovoltaic industry further,** and may be able to support Scope 3 emissions targets.

**A Circular approach would ideally focus on recovery and minimize disposal**

# Ideal Circularity is immediate and on-site.

## Practical Circularity is via the supplier's ecosystem.





# Specific action that each Photovoltaic cell producer can take

## Improve the circularity of your manufacturing process



For HF: The recovered HF may not be directly converted to eHF that is reusable for Photovoltaic cell production, however it can still be reprocessed for use by other industries.

# Learnings from Solvay Circularity efforts over 20 years



Every waste stream is unique, and  
(sometimes) requires a **custom**  
**solution**



Target a **quick-win**;  
Scale the minimum-viable solution  
over time



Make the process  
**permanent and routine**

**You do not have to solve this alone!**  
**Let us apply an ecosystem approach and bring forth industry-wide solutions.**

# We would love to engage with you!

## Meet the Team and Start Your Circularity Journey

### Solvay Fluorides

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The image features a collection of 3D geometric shapes, including spheres and cubes, rendered in various shades of purple and blue. Each shape is covered in a fine, hexagonal grid pattern, giving them a textured, crystalline appearance. The objects are arranged in a dynamic, overlapping composition against a solid light purple background. The lighting creates soft shadows and highlights, emphasizing the three-dimensional nature of the forms. In the center, the words "Thank you" are written in a clean, white, sans-serif font.

Thank you

SOLVAY