

Sustainability Initiatives to create innovative green solutions for carbon neutrality

Innovation for a Sustainable World

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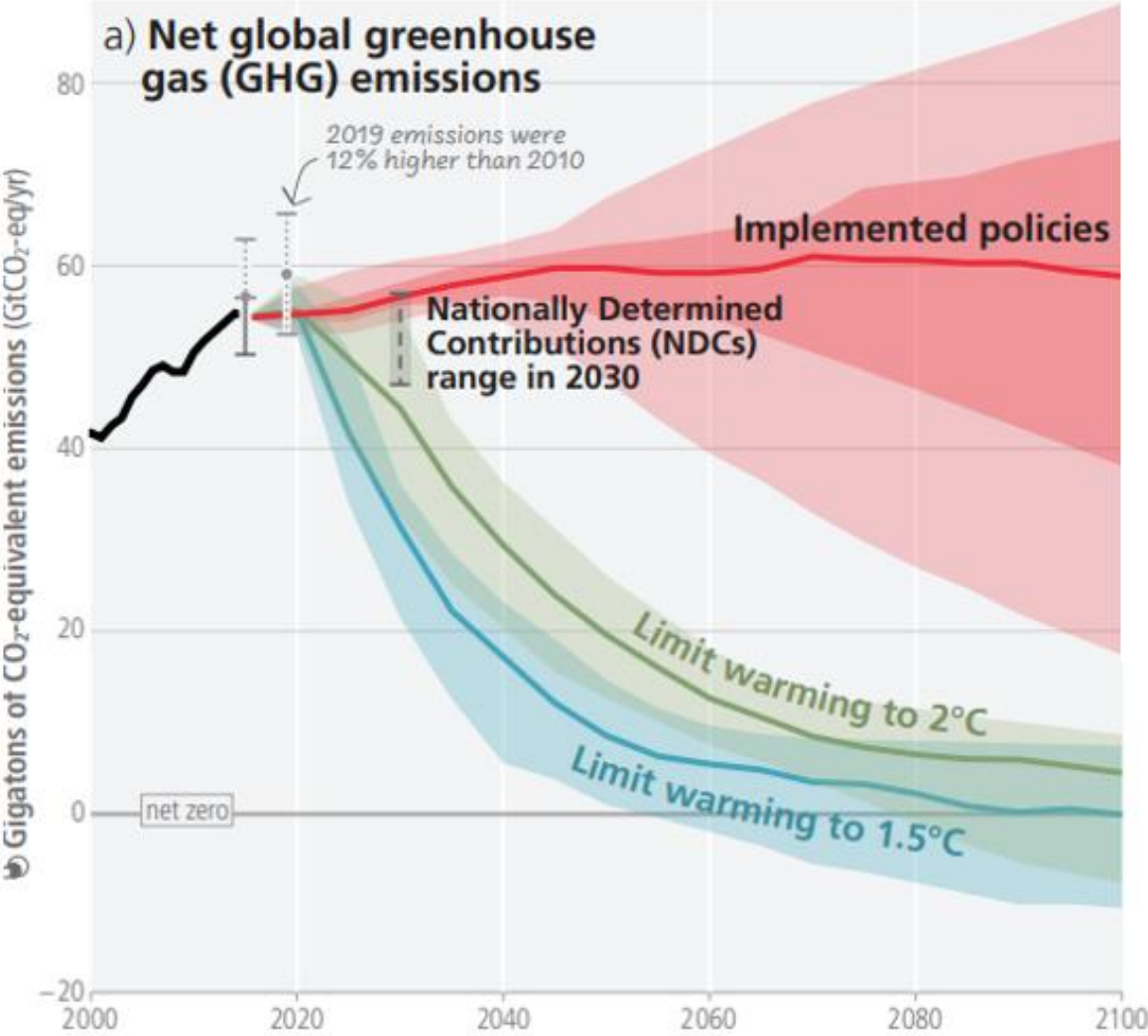
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Agenda

- **Background**
 - Environmental Impact Trends in the Semiconductor Industry
- **Challenge for “Carbon Neutrality”**
 - Key Issues to achieve Carbon Neutrality
 - Green Innovative Solutions
- **Future Outlook**

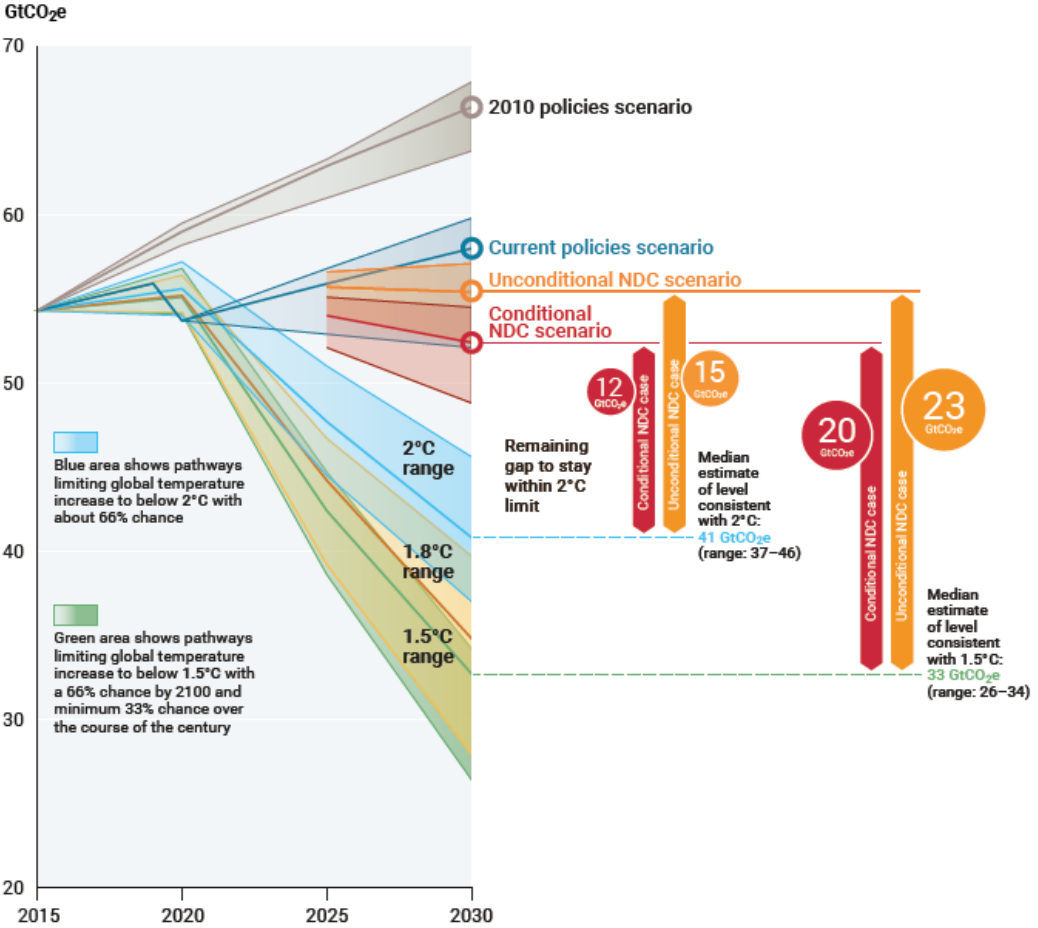
Background

Carbon Neutrality for Environmental Sustainability



【Source】 International Panel Climate Change (IPCC) Report 2023

Figure ES.3 Global GHG emissions under different scenarios and the emissions gap in 2030 (median estimate and tenth to ninetieth percentile range)

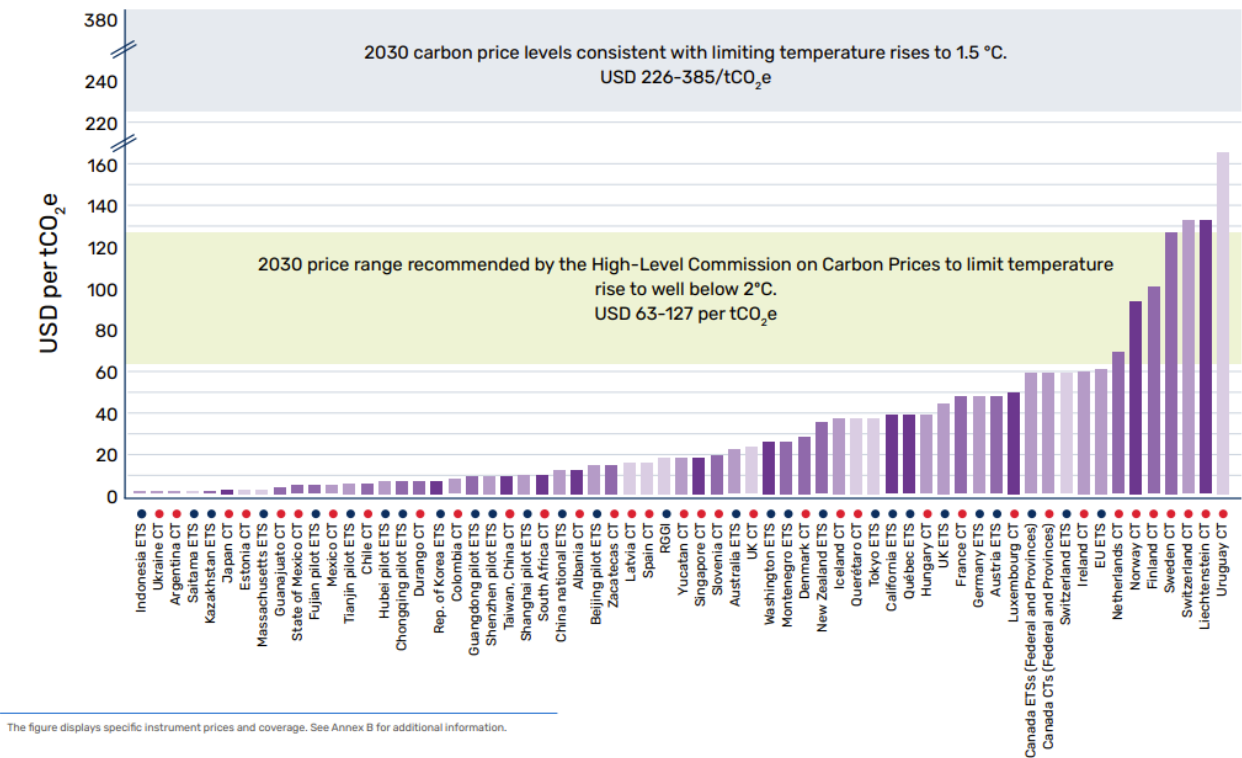


【Source】 Emissions Report 2022 @ UN Environment Program

Value of Environmental Sustainability

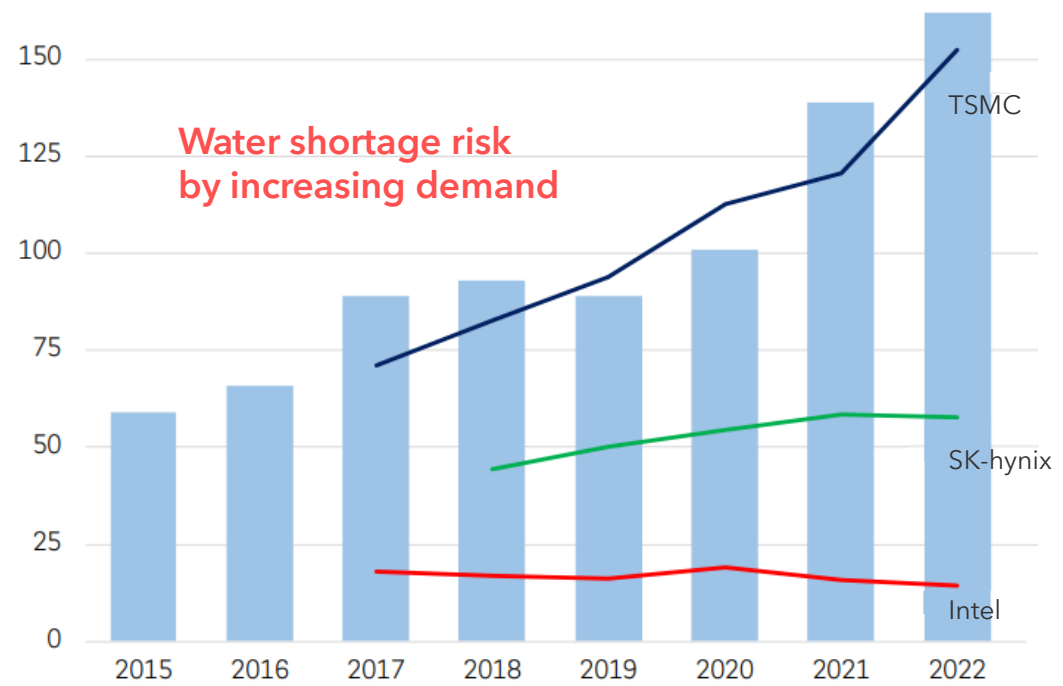
“Environmental Sustainability” is a good potential key as a differential technology.

- Carbon pricing



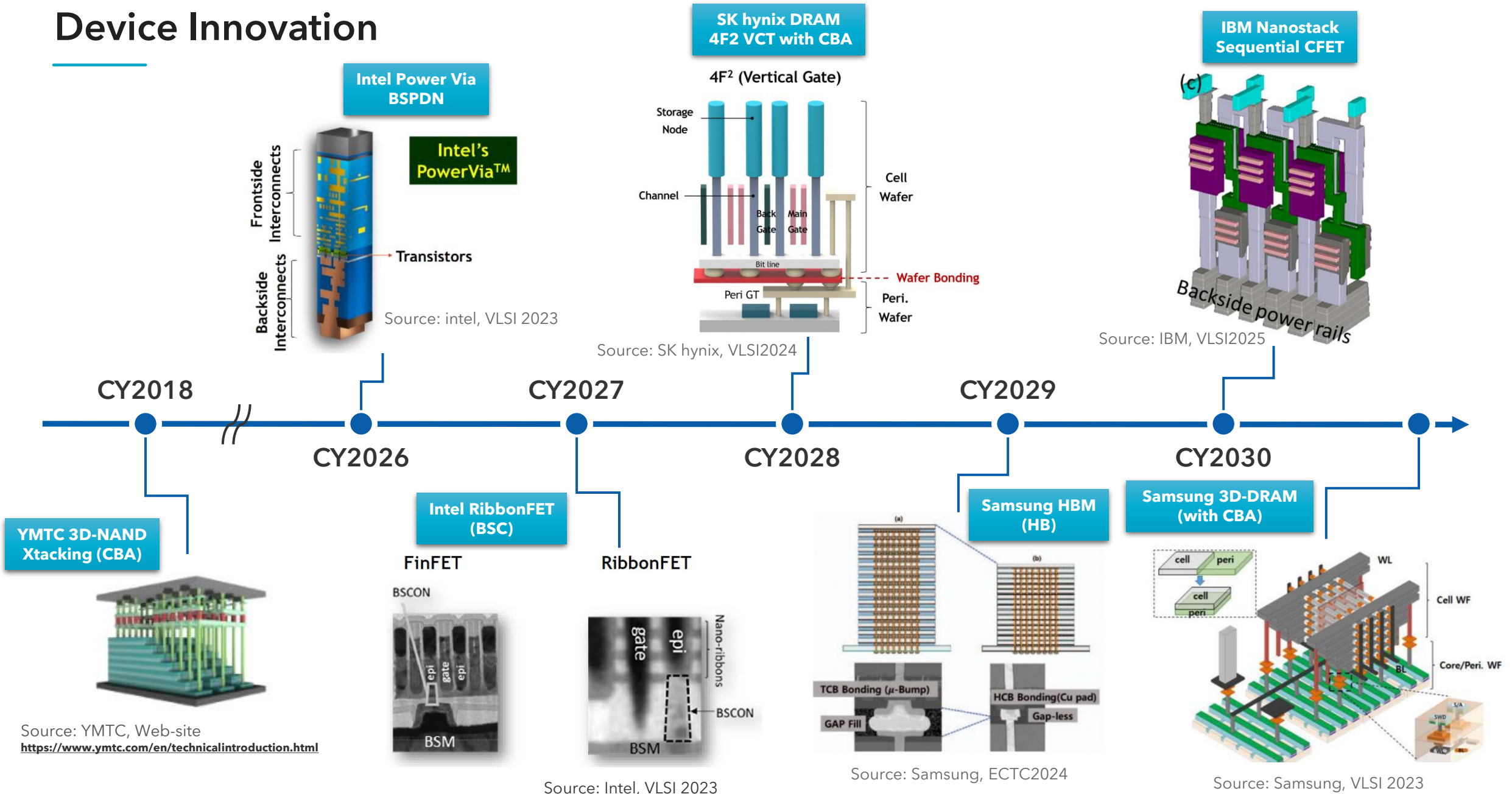
Source : Courtesy of Marijn Vervoorn @ASML/SEMI SCC BAR leader, original source: <https://carbonpricingdashboard.worldbank.org/compliance/coverage>

- Water demand for chip manufacturing



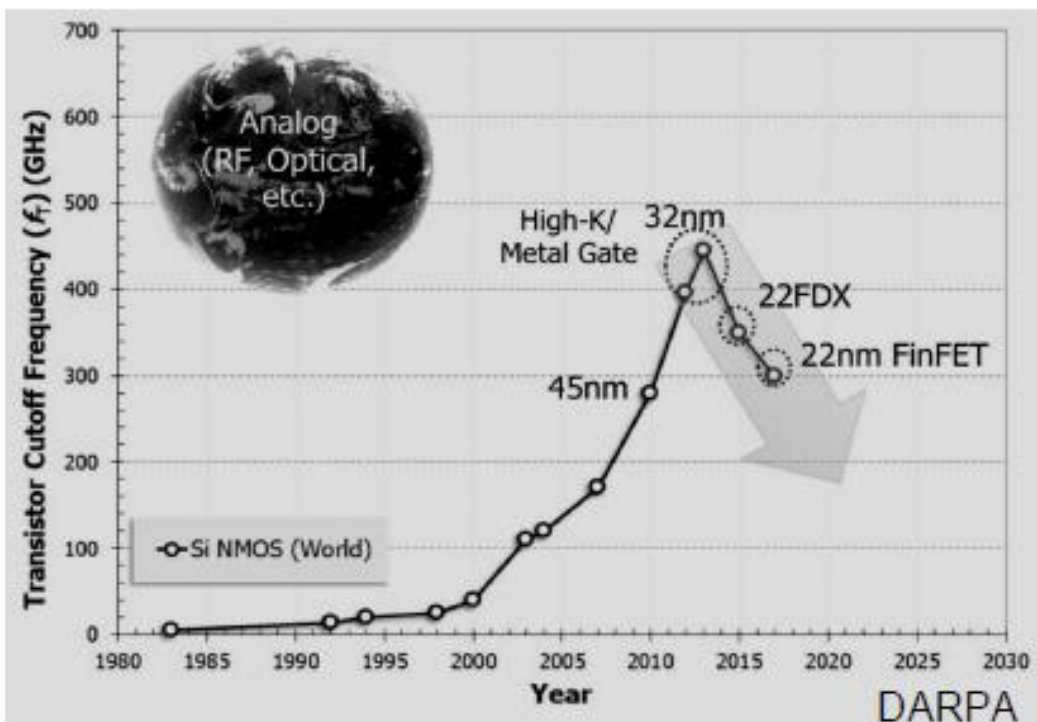
Source: [b4c6aa90-0077-4813-bb49-10f3db36aa2a \(bnpparibas-am.com\)](https://www.bnpparibas-am.com)

Device Innovation

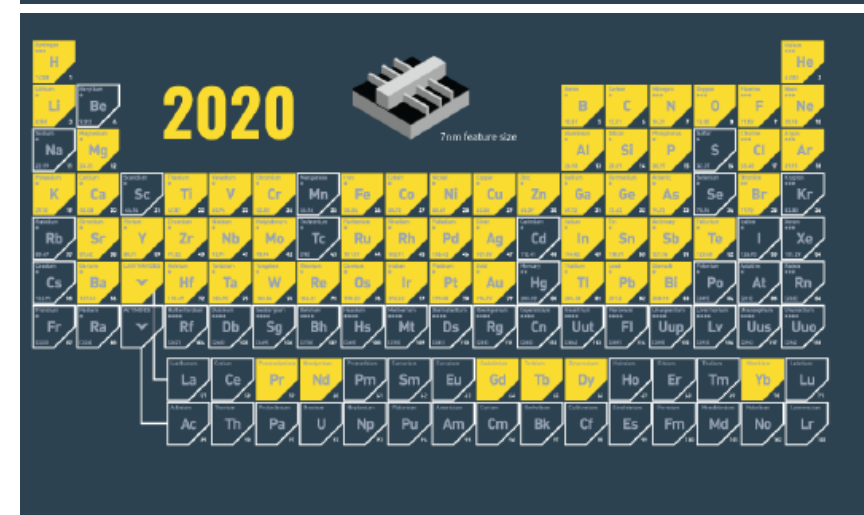
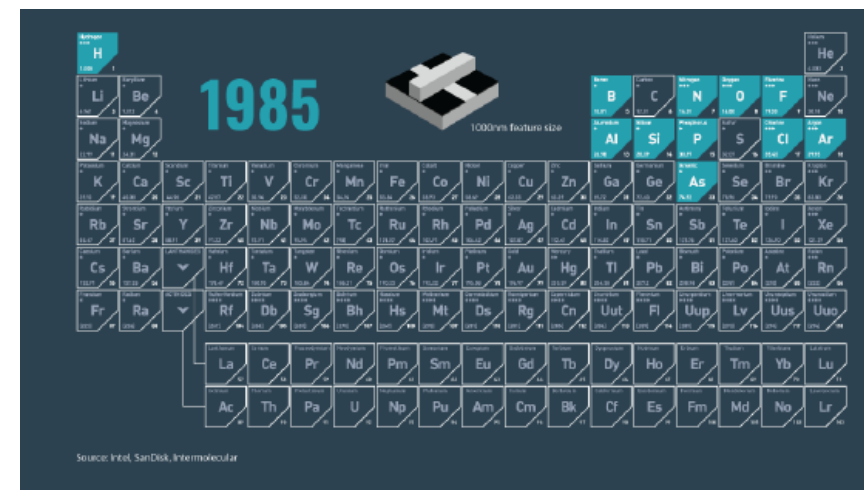


Material Innovation

Scaling has already reached its limits, and industry has driven different vectors of innovation: new materials, new devices, hybrid integration.



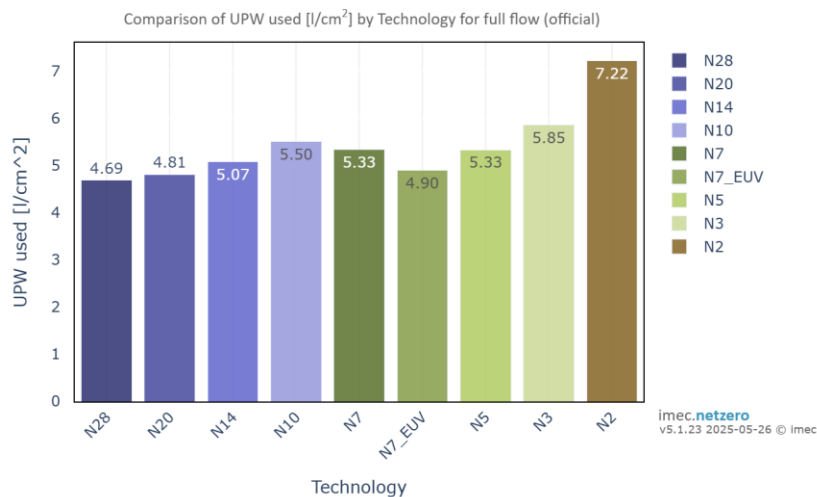
Source: Texas Instruments, VLSI 2024



Environmental Impacts of Scaling Device

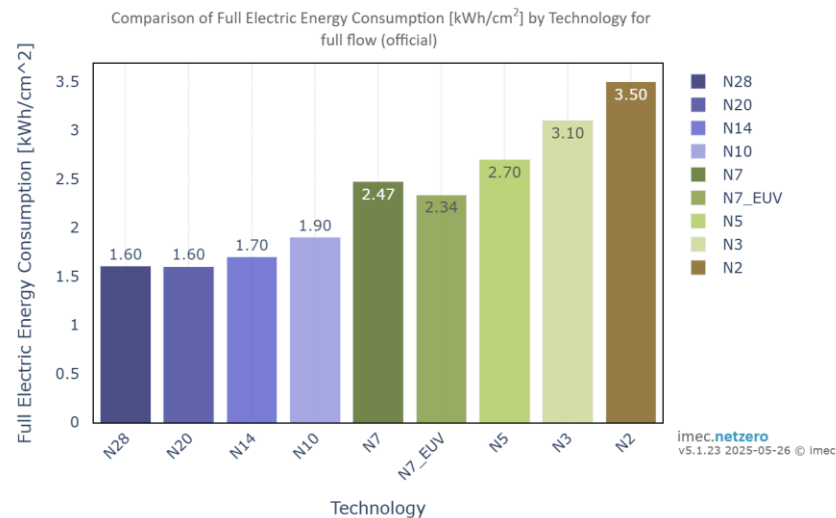
- CO2 emissions, UPW and Energy usages, increase with scaling device.
- SCREEN can propose new eco wet process solutions by collaborating with supply chain partners.

UPW



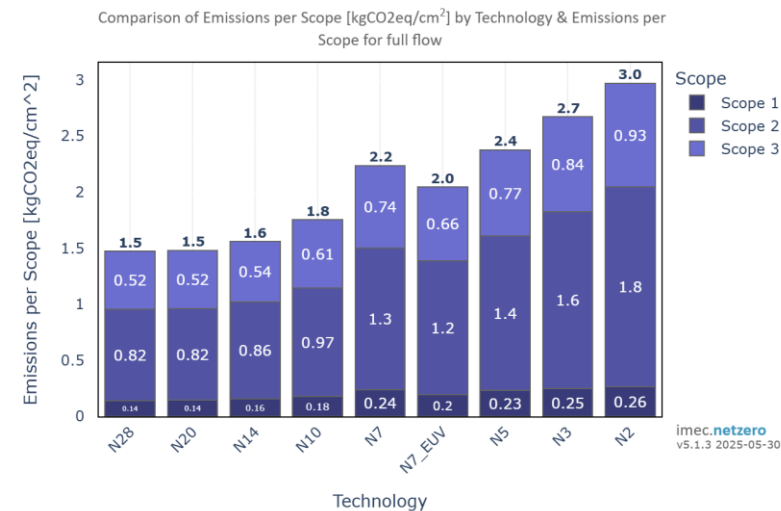
total UPW usage in l/cm² of 300mm wafer for full process flows

Energy



total electricity usage in kWh/cm² of 300mm wafer for full process flows

CO₂

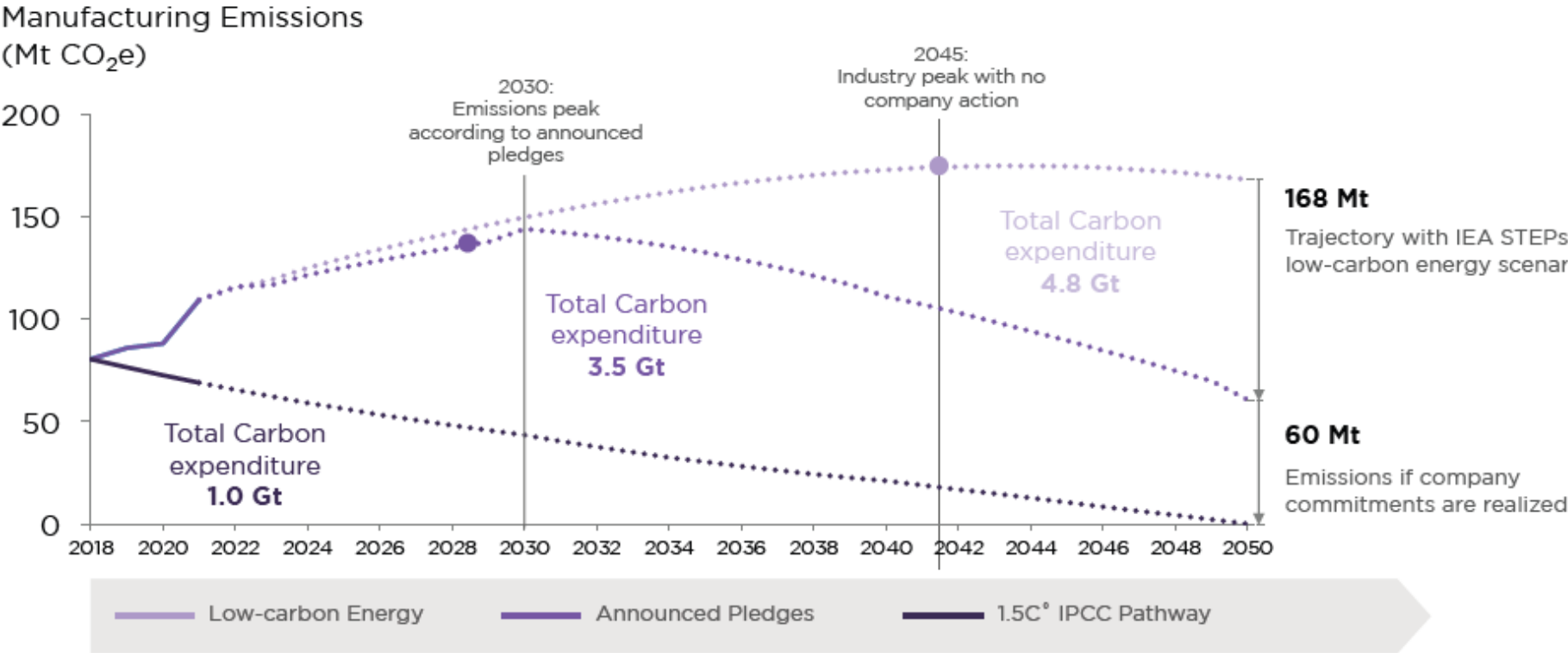


total GHG (CO₂eq) in kWh/cm² of 300mm wafer for full process flows

Source : Courtesy from Emily Gallagher @imec, Generated by <https://netzero.imec-int.com/> on 2025-05-30

Carbon Neutrality for Environmental Sustainability

Exhibit 7:
Announced sustainability pledges reduce total 2019–2050 emissions by 30% and are within 60 Mt CO₂e of 2050 net zero

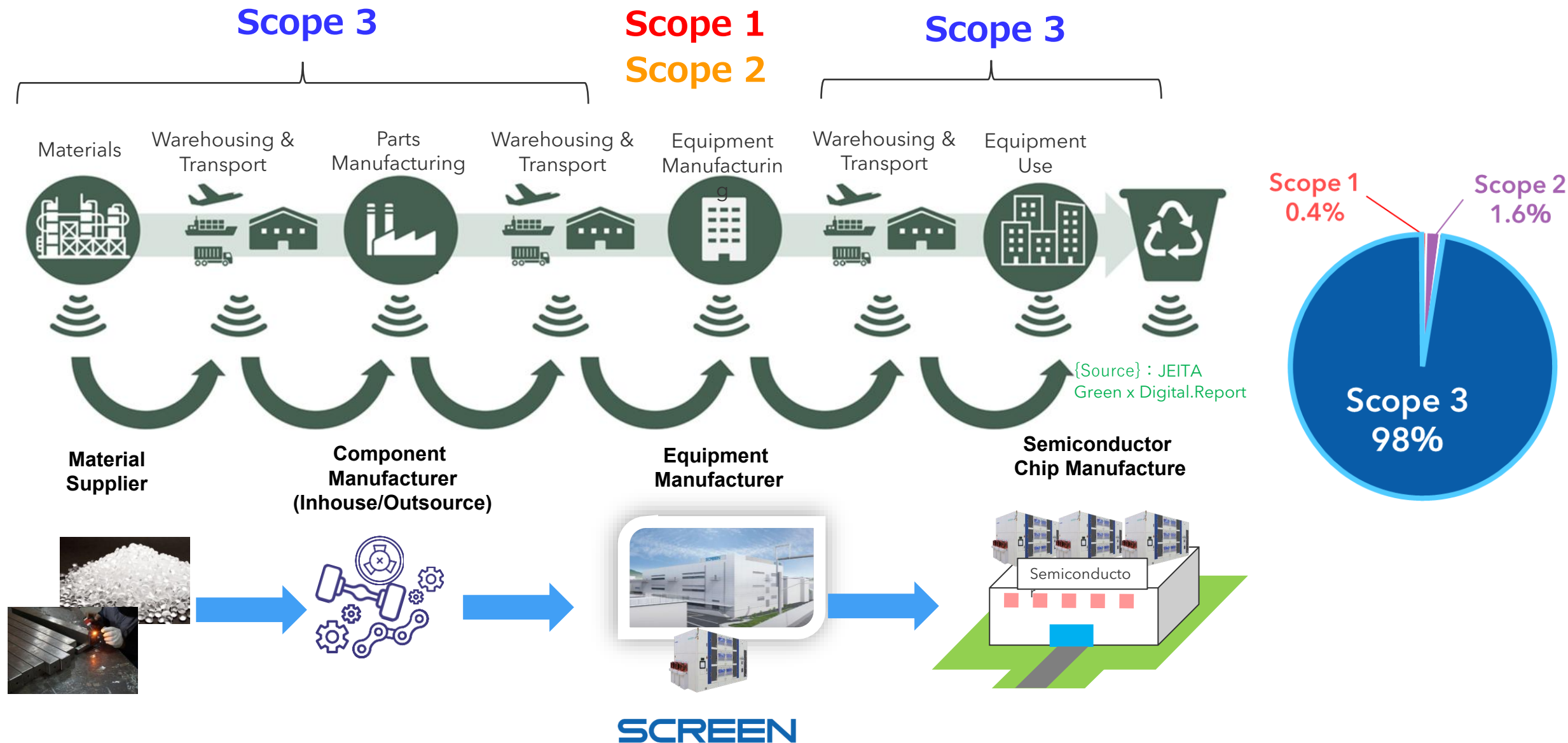


1 Emissions growth based on projected capacity growth (3.25%) and average intensity growth (1.01%), all else constant
Note: Low-carbon energy scenarios use IEA STEPS for North America, Europe, and Asia-Pacific. Source: BCG analyses on data from: CDP, imec, SEMI, IEA

【Source】 Transparency, Ambition, and Collaboration, SCC

Challenge for “Carbon Neutrality”

SCREEN's Green Strategy for Carbon Neutrality



Achieving Carbon Neutrality by 2050

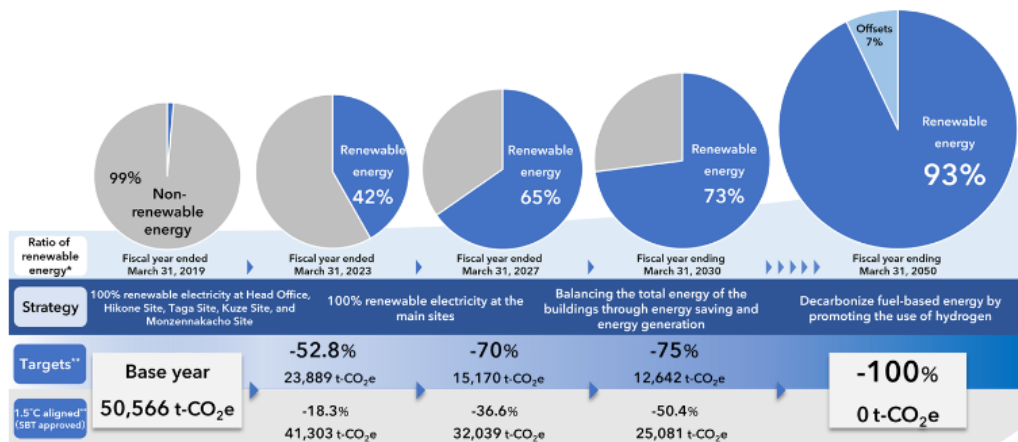
Achieving Carbon Neutrality by 2050

Carbon Neutrality Declaration

We are working to reduce the greenhouse gases (GHG) emitted by our businesses. Our goal is to support the achievement of carbon neutrality by 2050.

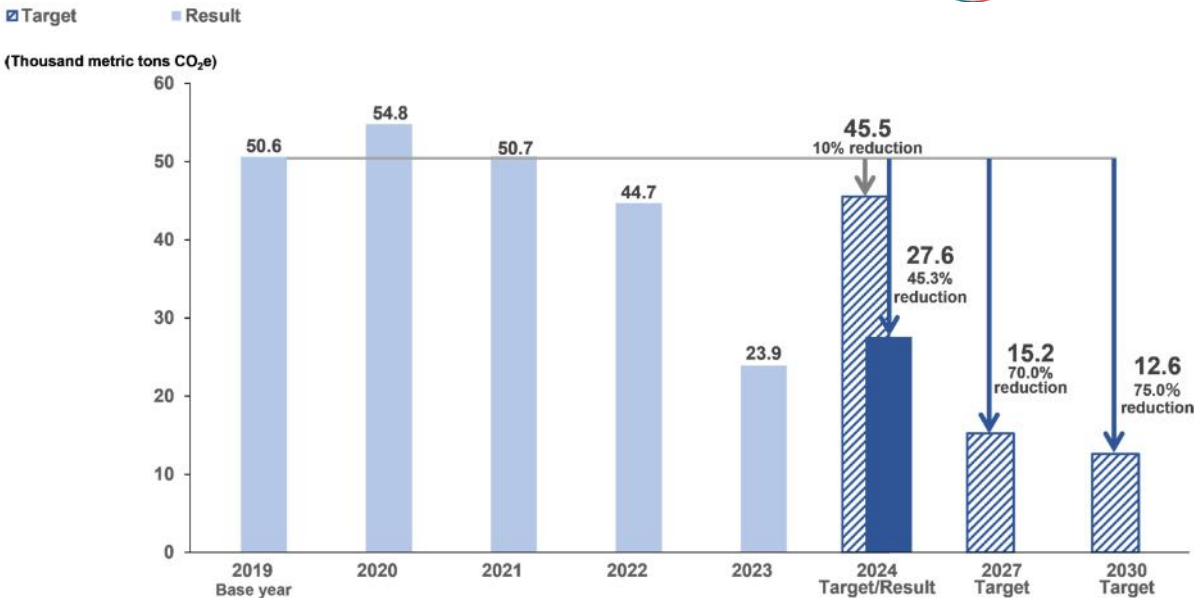
With respect to the GHG emissions produced by our business activities, we are currently implementing climate change initiatives at a pace that will help to keep global temperature rise below 1.5°C. We will contribute to the decarbonization and sustainable development of global society by advancing three approaches: expanding the use of electricity derived from renewable energy, effective energy management (energy saving, energy generation, and improving production efficiency), and decarbonizing fuel-based energy.

Decarbonization targets (business activities)



* Ratio of renewable energy introduced to total energy use (kWh conversion)
Ratio of renewable energy includes electricity derived from renewable energy sources as well as conversion to hydrogen and other green fuels
** Percentage reduction compared to the base year

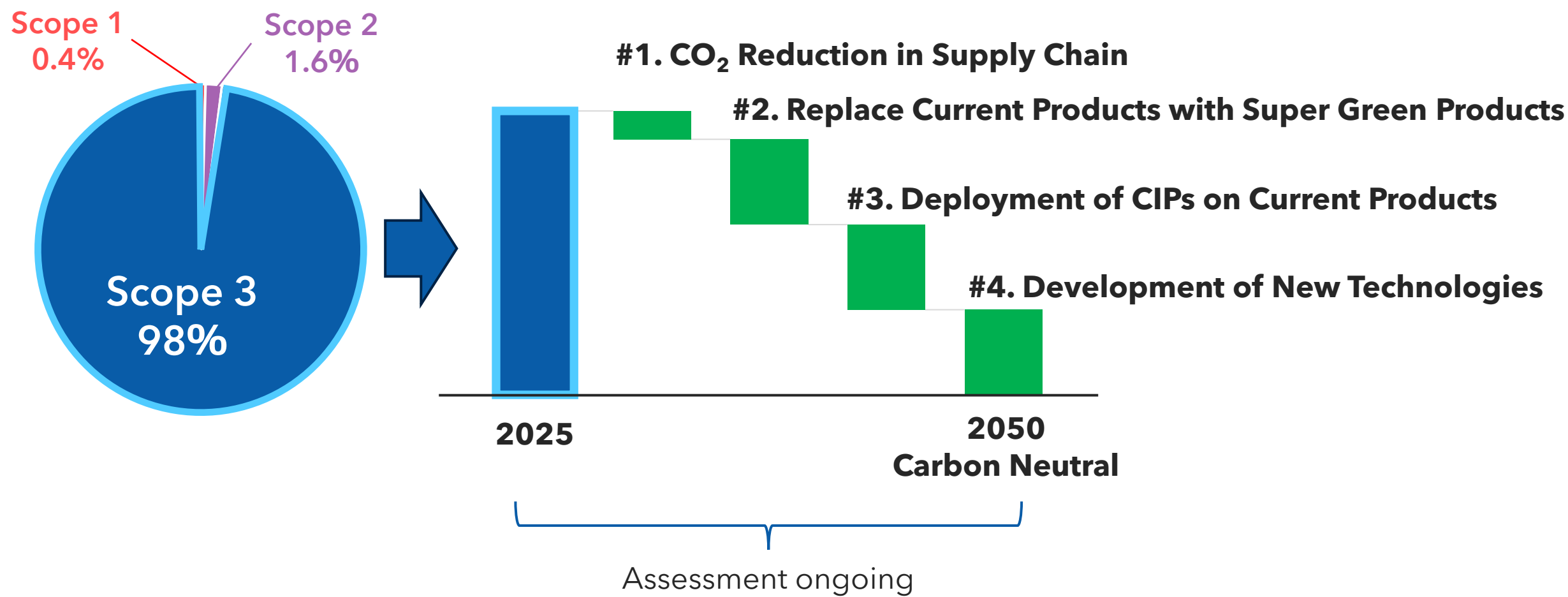
CO2 emissions from business activities (Scope 1, Scope 2)



Source: https://www.screen.co.jp/en/sustainability/environment/climate_change

SCREEN's Green Strategy for Carbon Neutrality

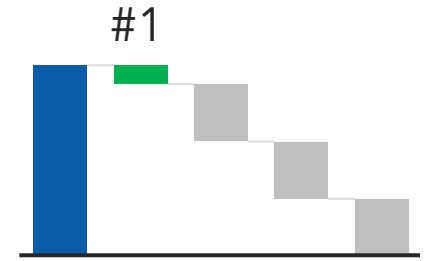
Four main approaches



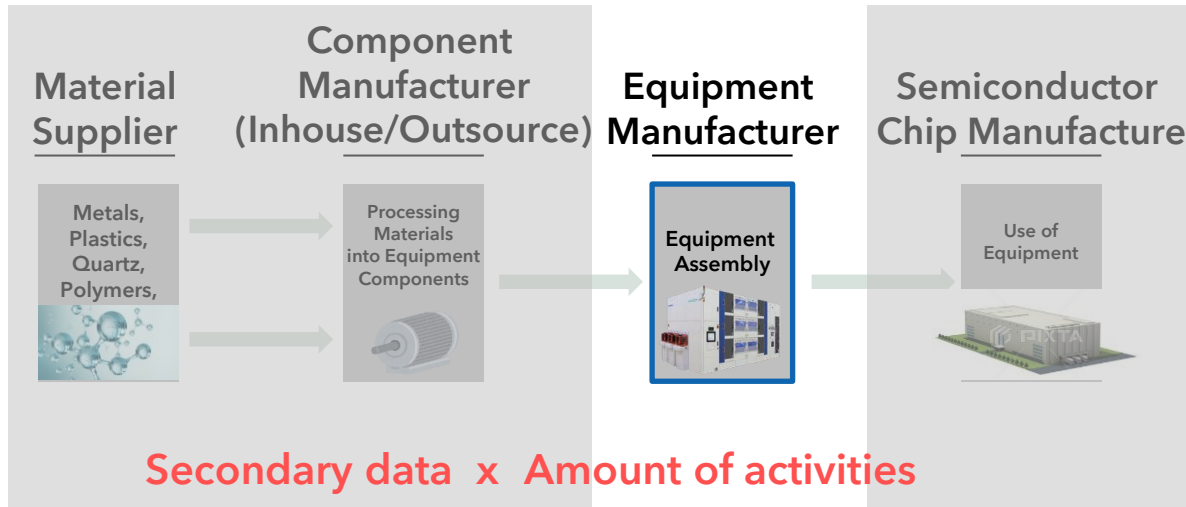
Strategy-based Activities: #1

CO₂ Reduction in Supply Chain

- Help needed for primary data definition of actual CO₂ emissions

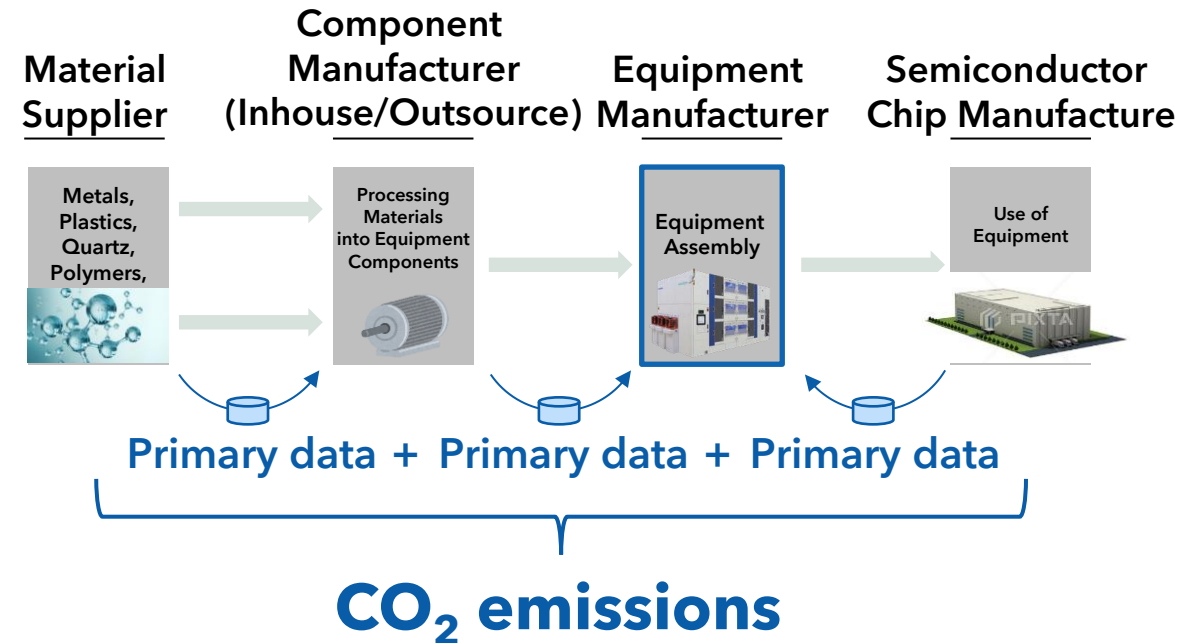


As is



CO₂ emissions $\propto$ Amount of activities

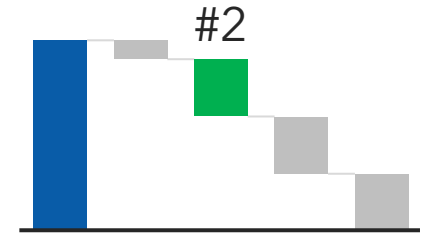
To be



Strategy-based Activities: #2

Replace Current Products with Super Green Products, SU-3400

- **Reducing GHG emission by > 40%**



AQUASPIN



SU-3400

Productivity + Capability

- Throughput of up to 1,200 wph
- Footprint reduced by 30%

Sustainability

- Reduction of environmental load
 - ✓ Exhaust by 40%
 - ✓ Nitrogen by 40%
 - ✓ Chemical by 25%
 - ✓ DIW by 30%

Strategy-based Activities: #3

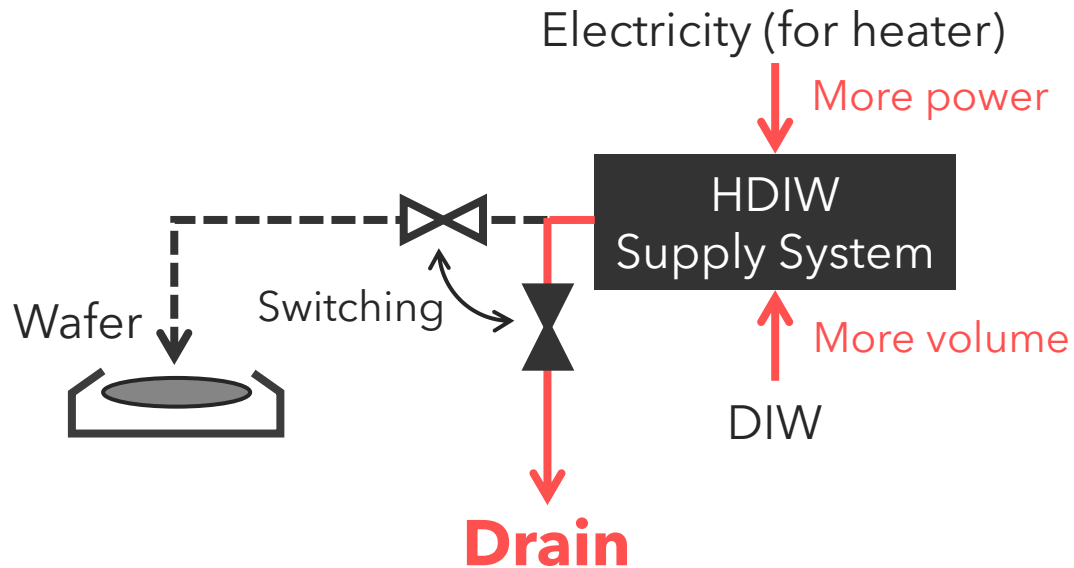
Deployment of CIPs on Current Products:

Green HDIW Supply System

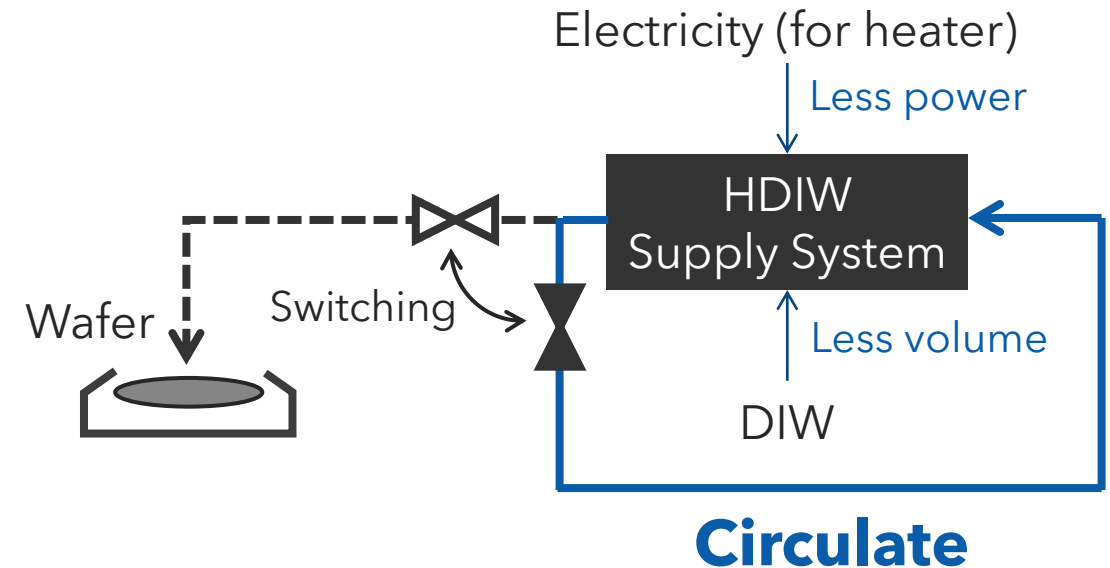
- **Reducing DIW and Electricity Consumption by > 80%**



Conventional HDIW Supply System



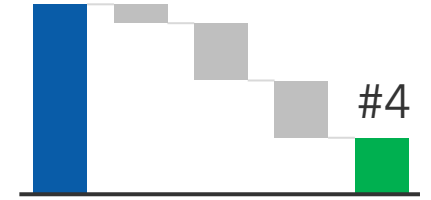
Green HDIW Supply System



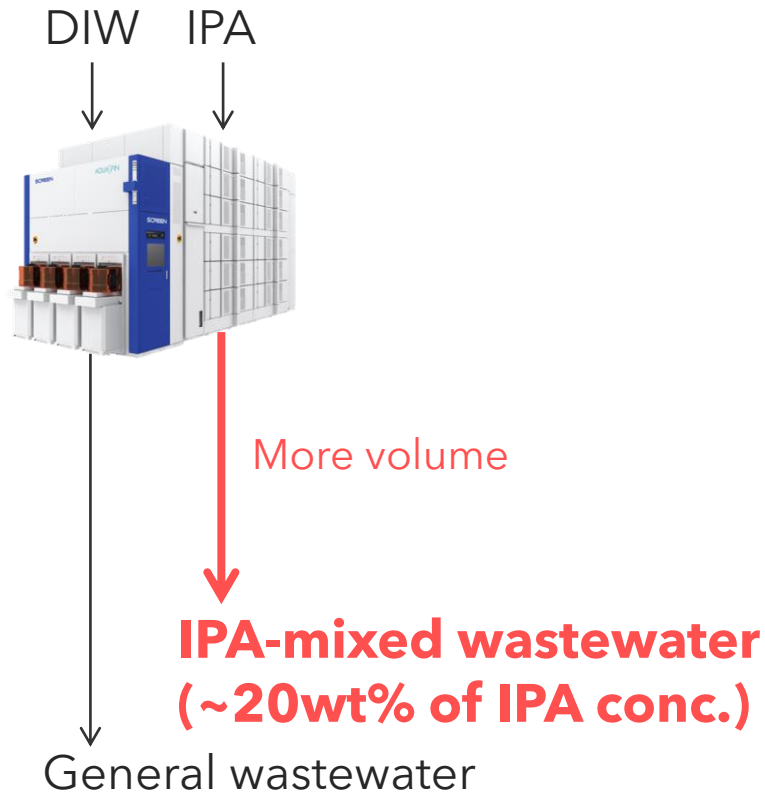
Strategy-based Activities: #4

Development of New Technologies: Green IPA Drain

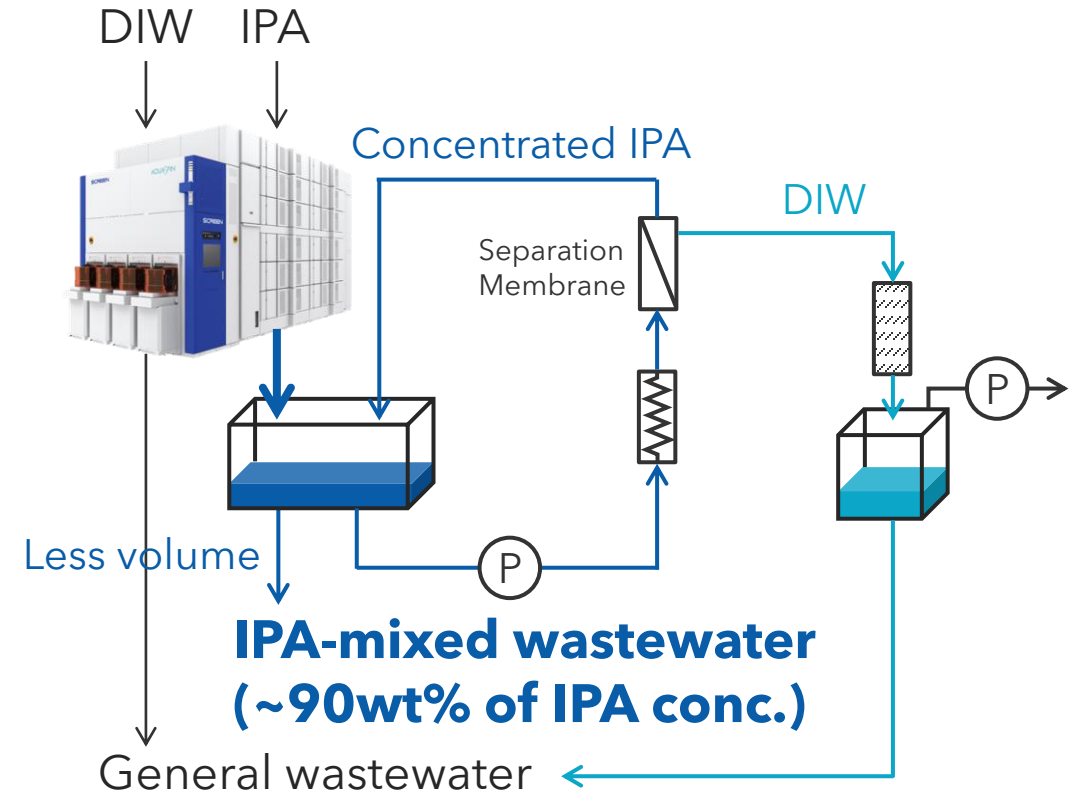
- **Reducing IPA-mixed Wastewater by > 75%**



Conventional Drain System



Green Drain System



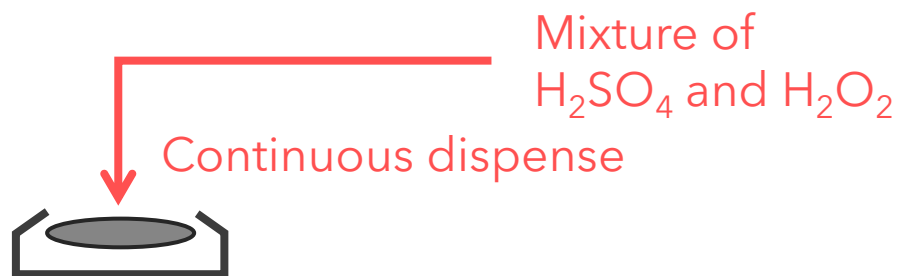
Strategy-based Activities: #4

Development of New Technologies: Green PR Strip

- Reducing H_2SO_4 and H_2O_2 consumption by > 90%



Conventional PR Strip

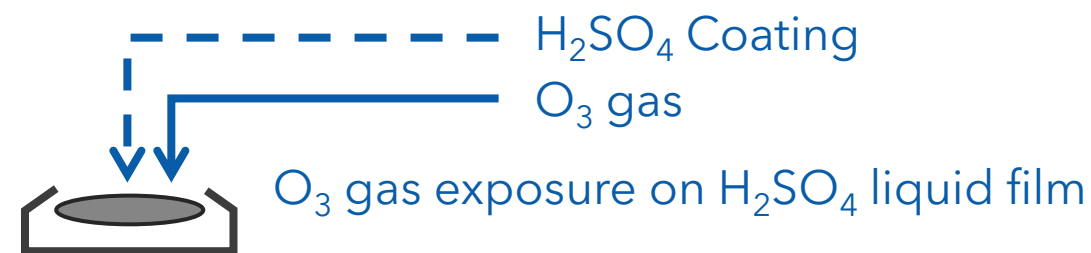


Need H_2O_2 supply

H_2SO_4 conc. decreases

Consumption $\propto$ Process time

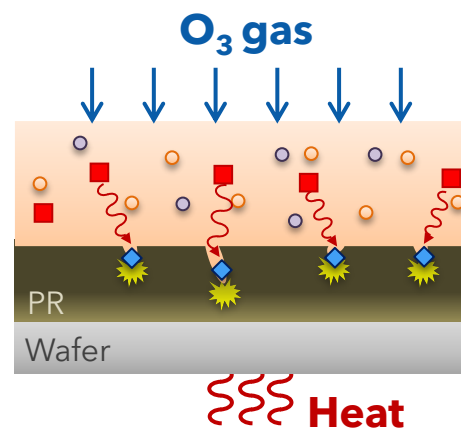
Green PR Strip



No H_2O_2 needed

Constant H_2SO_4 conc.

Very low consumption

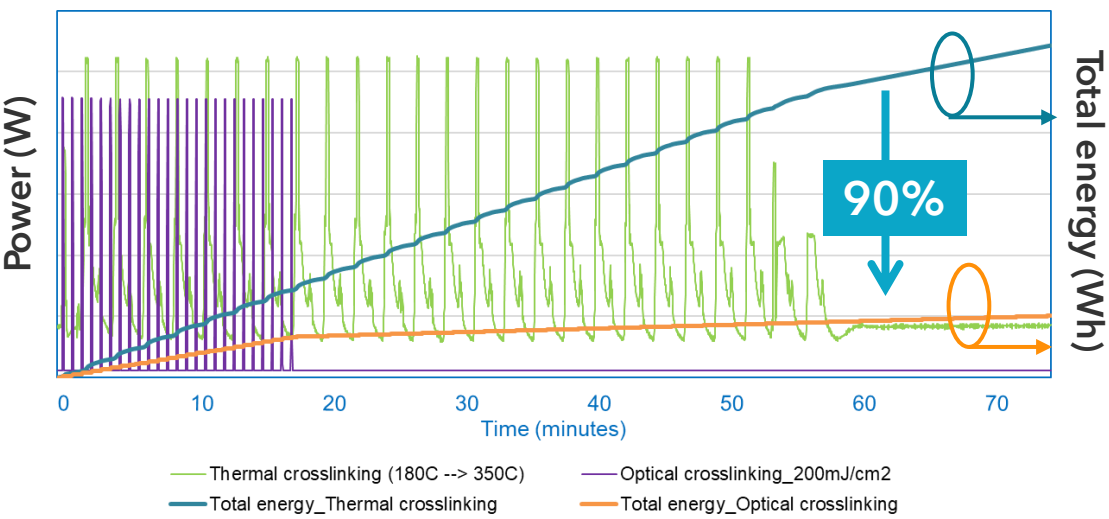
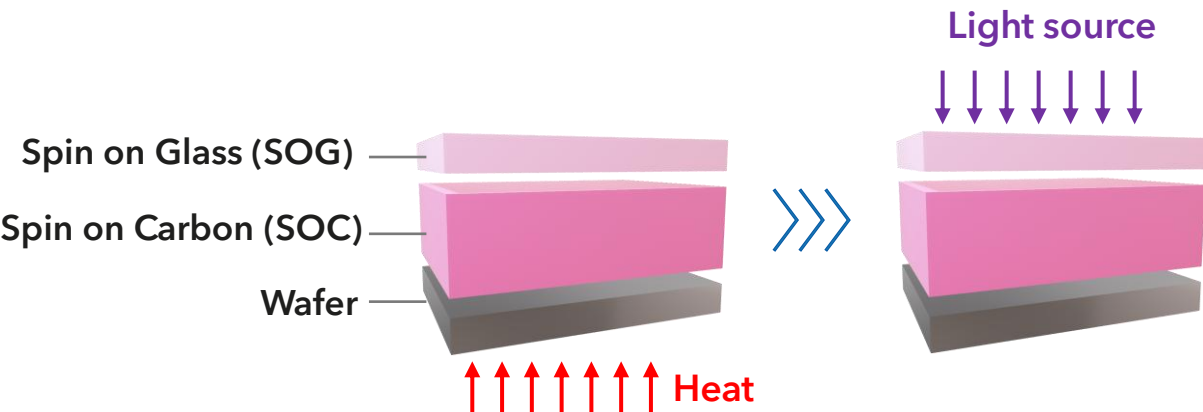


Strategy-based Activities: #4

Development of New Technologies: Light-curing tri-layer



Concept : Changing from the heater to light source to reduce the power



Thermal crosslinking

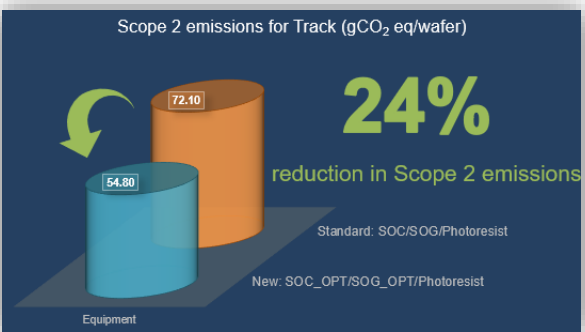
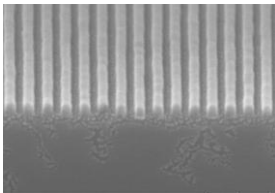
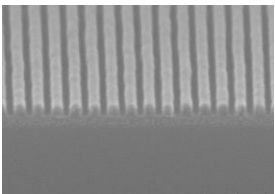
Optical crosslinking

Power-on

Anytime
(to keep the temp.)

During process

After etching pattern
(EUV/ pitch-28nm)

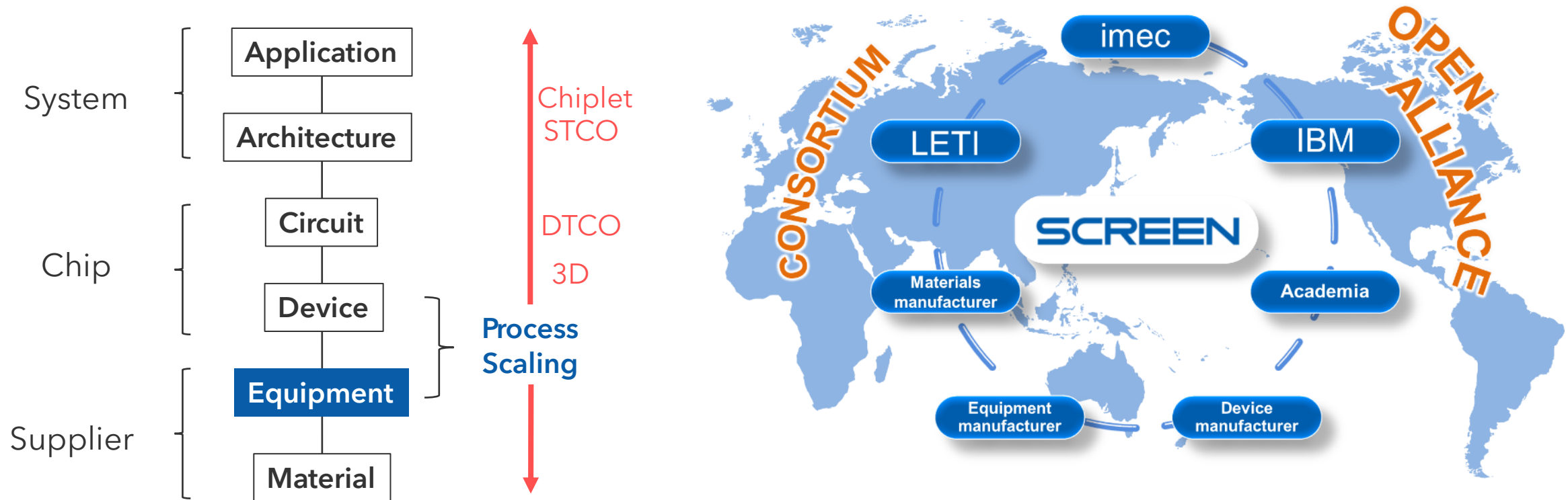


CO2-e by imec net zero

Future Outlook

An Ecosystem for Technology Development to achieve Carbon Neutrality

- Key factor of scaling value spreads from the material layer to the system layer.
- Need to collaborate partners, such as consortium and open alliance, all over the world.



A Better Tomorrow With Our Partners



Innovation for a Sustainable World

人と技術をつなぎ、未来をひらく

