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semi™ | Semiconductor Climate Consortium

# Calculating the Climate Impact of Digital Technology

Welcome!

SUSTAINABILITY

CONNECT - COLLABORATE - INNOVATE - GROW - PROSPER

# Agenda

8:00 Welcome & Introduction - Mousumi Bhat, PhD (Singapore)

8:05 What is a Handprint and Why To Calculate It

- Chris Jones, Edwards (U.K.)
- Ajay Gupta, MIT (U.S.)

8:15 Q&A

8:20 Looking Forward & Next Steps - Panel Discussion

- Marijn Vervoorn, ASML (The Netherlands)
- Greg Norris, MIT (U.S.)
- Tiina Pajula, AFRY Management Consulting (Finland)
- Moderator: Mousumi Bhat, PhD

8:40 Final Q&A and Closing

# Housekeeping

- Microphones are muted
- Q&A panel at the bottom of your screen are available throughout the meeting
- Chat panel may be used for less formal information such as referenced URLs or contact emails
- A link to the recording will be emailed to you
  - Slides can also be accessed via that link

Please take the poll!
If it does not show up in the Webinar POLL panel, scan this QR code

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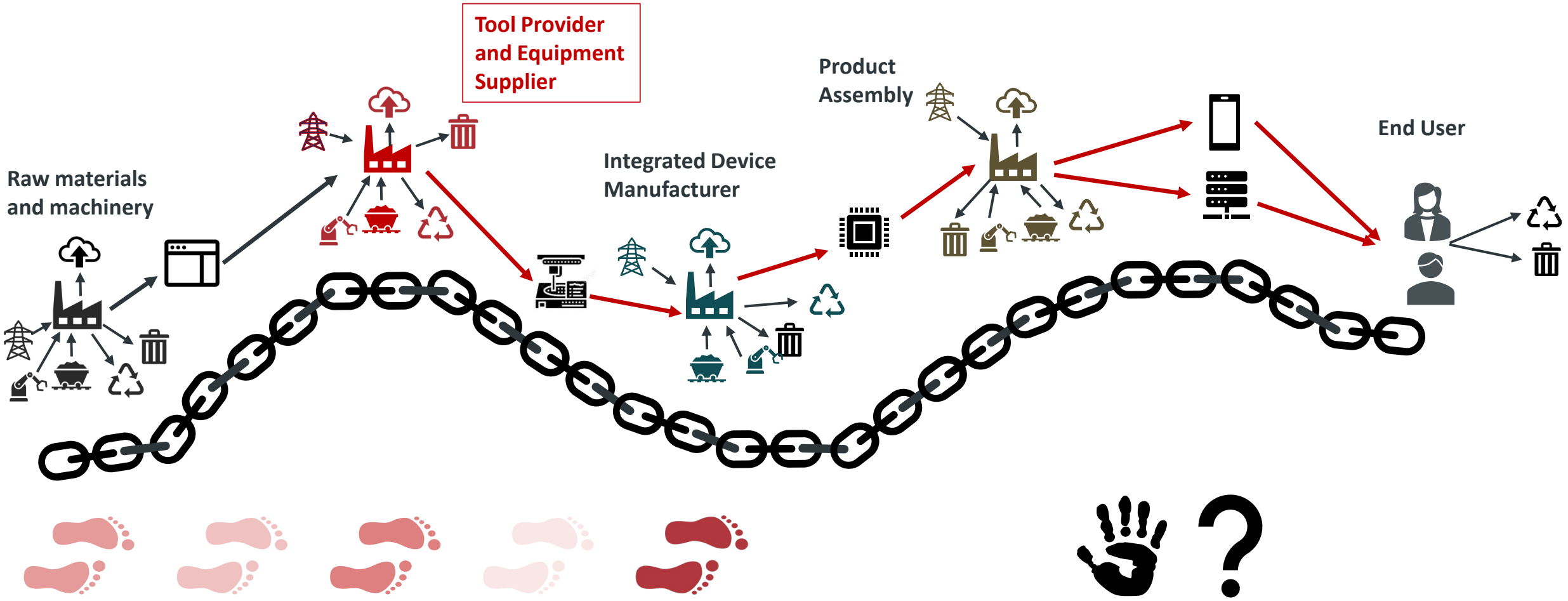
# What is a Handprint and Why To Calculate It

**Chris Jones, PhD**
Environmental Solutions
Business Development
Manager
Edwards

**Ajay Gupta, PhD**
Postdoctoral Associate
MIT

# Value Chain


Tool Provider and Equipment Supplier
Product Assembly
End User
Integrated Device Manufacturer
Raw materials and machinery

# Outline case studies – but where's the handprint?

Solar Installations Beyond RE Wrappers

Steel For Bridges >5,000 Tonnes $CO_2e$ Per Foundry Per Year – But Also Improved Lifetime

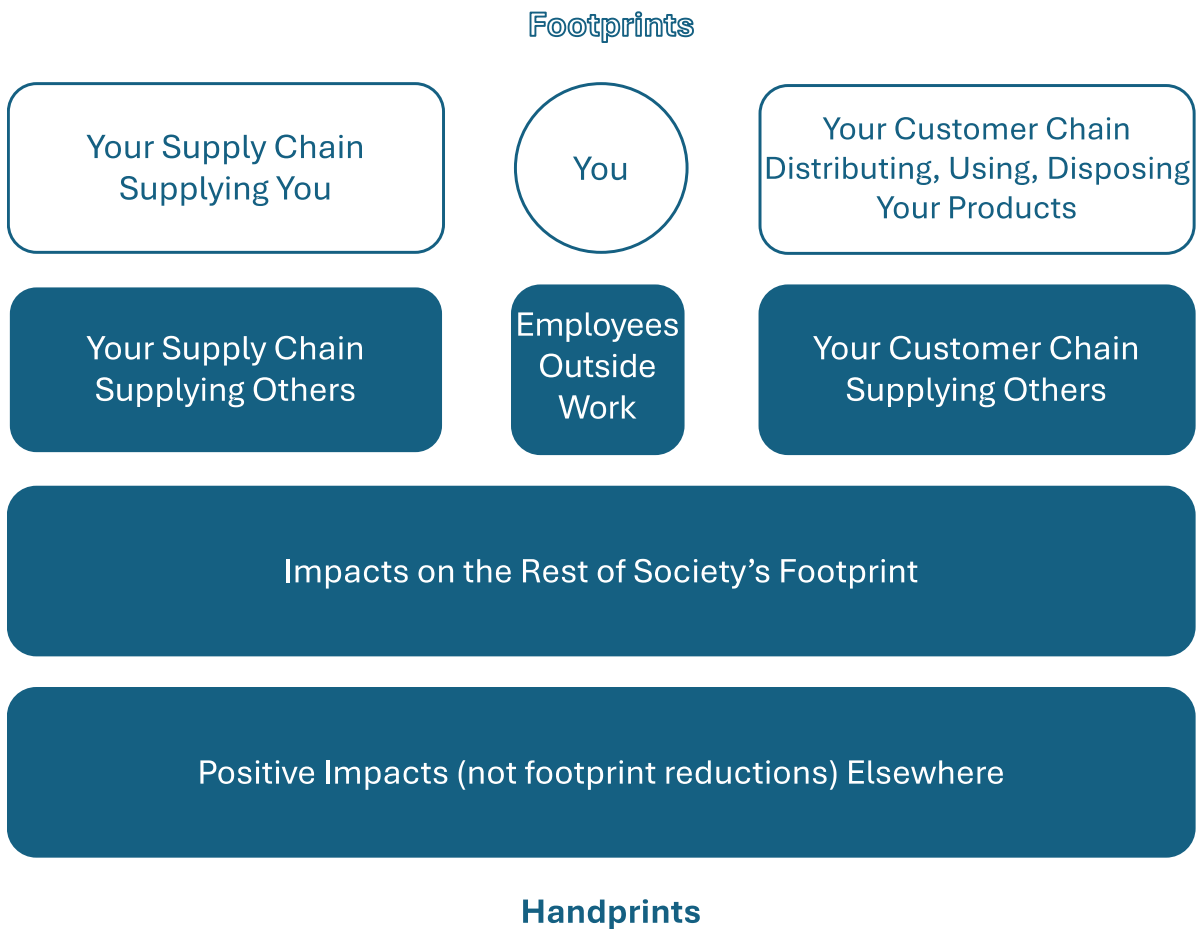
EV Chargers – No RE At Home

23 Million Metric Tonnes Per Year Avoided Emissions




EDWARDS

# Handprints of Digital Technology




A handprint represents the environmental impact an entity (e.g. product, technology or organization) generates beyond its own footprint. These impacts would not occur if the entity did not exist.

# Baseline of Handprint Reporting

A handprint represents the environmental impact an entity (e.g. product, technology or organization) generates beyond its own footprint. These impacts would not occur if the **entity did not exist.**

The **baseline** for measuring handprints is the “most likely scenario **IF** this entity (e.g. product, technology or organization) did not exist”.

# Proximity of Handprint Reporting

Footprints and handprints should be presented side-by-side using the same units. This provides context for both data points and helps minimize greenwashing by ensuring stakeholders can easily compare (not offset) the two. NO NETTING

# Category Consistency

Handprints should only be compared to footprints within the same impact category, such as greenhouse gas emissions, resource consumption, pollution levels, etc. This ensures comparisons are relevant and meaningful, allowing for an accurate overall assessment of an entity's impact.

$CO_2$-eq

Water

# Rebound Effects

Increased consumption resulting from environmental efficiency interventions, facilitated by mechanisms such as price reduction or other factors, including behavioral responses.

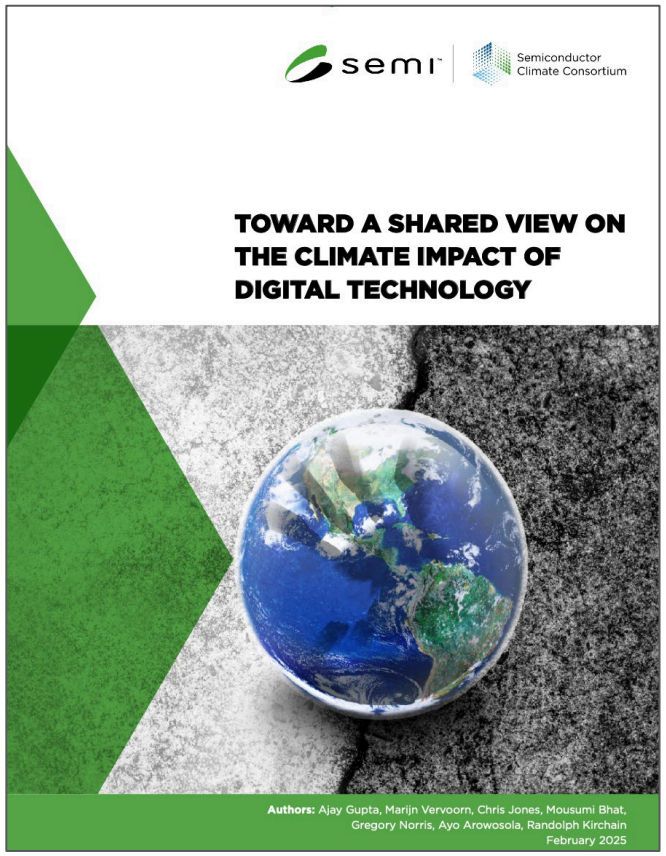
# Negative Handprints

In the same way an agent can choose to deliver a positive impact within society, one could also choose to use products negatively.

Companies lobbying against necessary regulations and standards and promoting the sales of high footprint products where low footprint alternatives are cheap and abundant could constitute a negative organizational handprint.

# Please download the paper…

https://discover.semi.org/climate-impact-of-digital-technology-download-form.html

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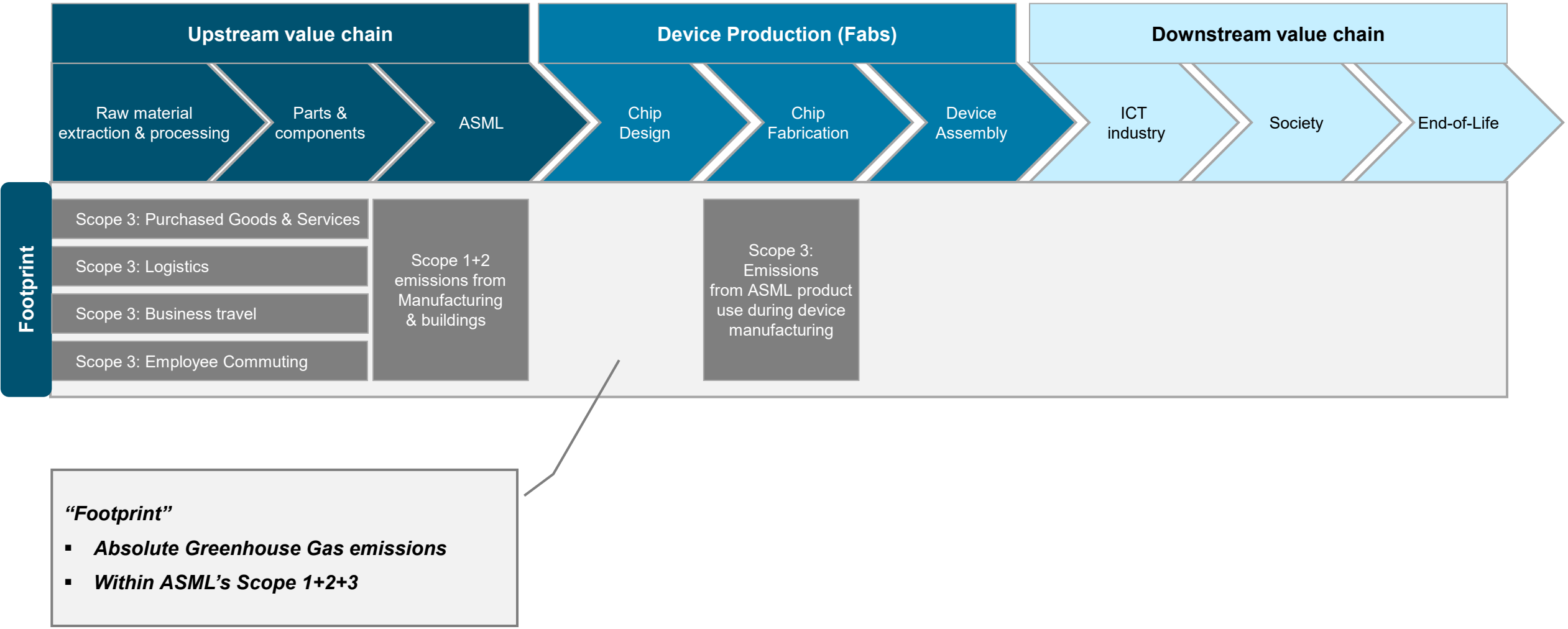
Vice President
Sustainability
SEMI
**Moderator**

**Marijn Vervoorn**
Director Sustainability
Strategy
ASML

**Dr. Gregory Norris**
Director, Sustainability
and Health Initiatives for
NetPositive Enterprise
MIT

**Tiina Pajula**
Senior Principle
AFRY Management
Consulting

# Recap: If we talk about our company's Greenhouse Gas footprint, we look at absolute Greenhouse Gas emissions within ASML's Scope 1+2+3

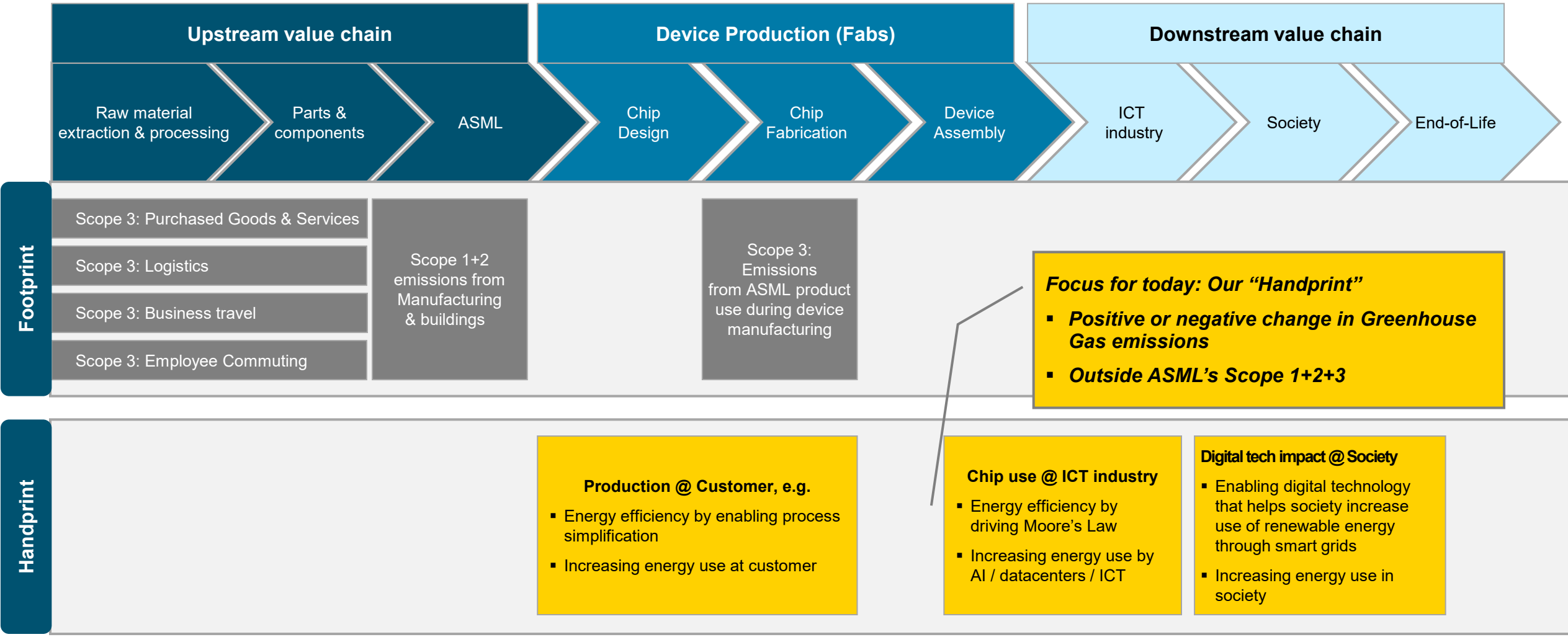



*"Footprint"*

- ***Absolute Greenhouse Gas emissions***
- ***Within ASML's Scope 1+2+3***

ASML

# Our toolkit of methods needs to evolve to provide a robust and balanced understanding on the aggregated climate impact across the value chain



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Senior Principle
AFRY Management
Consulting

# Next Steps of Handprint

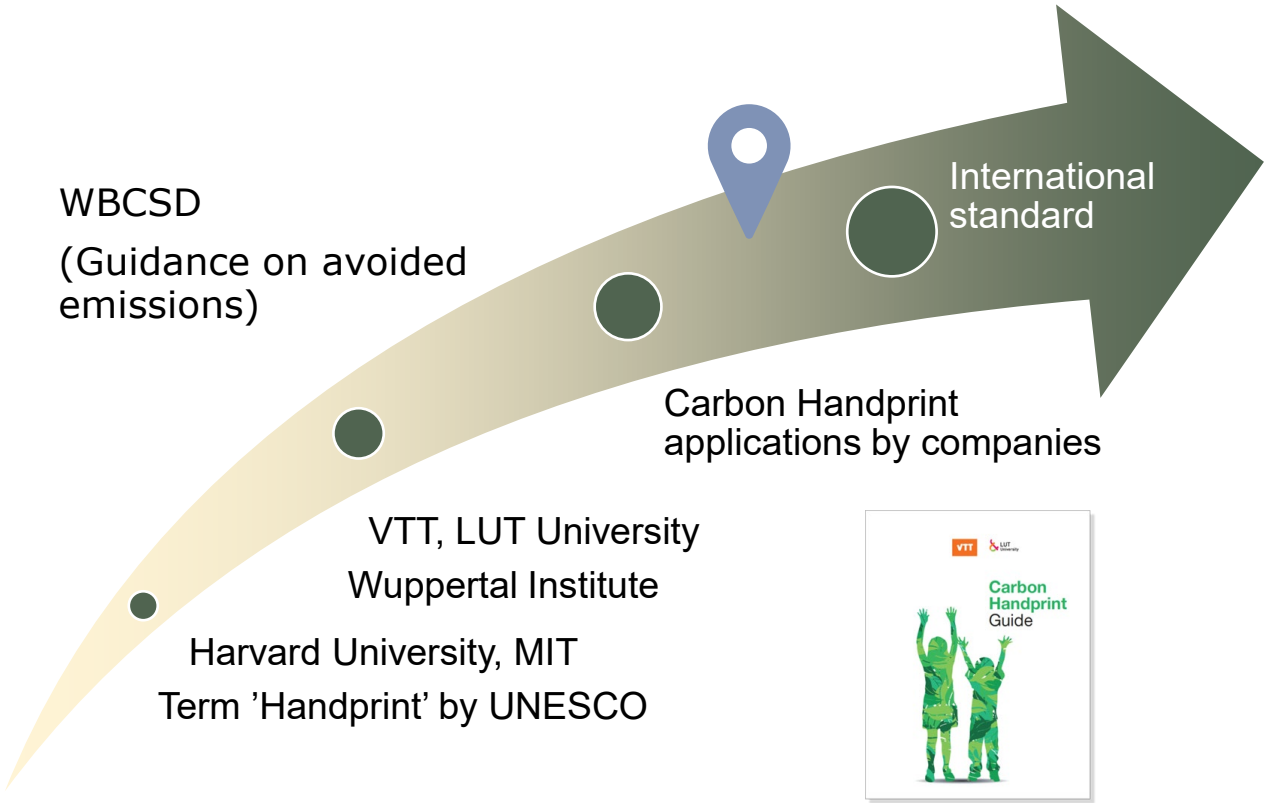
Tiina Pajula, AFRY Management Consulting

MARCH 2025

Tiina Pajula
Senior Principal
Tiina.Pajula@afry.com
+358 40 5899 013

AFRY

# Solvers of climate challenge to the spotlight!







Valuable input for regulatory and voluntary frameworks

- Recognized by SBTi, CDP and TCFD

Both the negative and positive climate impacts of strategic decisions will be understood

Companies that provide solutions with positive impacts, handprints, will be essential for the green transformation



AFRY

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**Thank you for Attending!!**

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# ANNOUNCEMENTS

GCS
GLOBAL CLIMATE SUMMIT WORKSHOPS

# Objective

SEMI, the Semiconductor Climate Consortium (SCC), Google and other hyperscale partners, are looking forward to accelerating our joint decarbonization roadmap. This forum is an invitation to supply chain partners that share that goal to share their progress and highlight gaps for focus.

**Interest Form:**

https://forms.office.com/r/9tMSKL6Dvi

**Date:** May 15-16 & 19-20, 2025

**Where:** Co-located with SEMICON SEA, Singapore (May 20-22)

**Who:** Open to all Corporate sustainability professionals & leaders from the entire value chain

**Schedule** *(subject to change):*

**Thursday (5.15 PM)** Kick-off: Keynotes & Fab Tours

**Friday (5.16)** Fab Scope 1 & Energy Efficiency Workshops

**Monday (5.19)** RE Education & Advocacy & Manufacturing Scope 3 Materials

**Tuesday (5.20)** Data & Reporting Workshop & Closing Remarks/Next Steps

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Semiconductor Climate Consortium
Google

*Virtual Fireside Chat*

# Navigating Climate Risk in the Semiconductor Value Chain: Metrics, Tactics, and Strategies

Join us for this special session of the SEMI Environmental Risk and Mitigation Reporting Working Group. Open to all SEMI members.

See how to identify and measure climate risks in the semiconductor value chain and develop strategies for integrating climate risk into internal business decisions.

**2 sessions available during work hours:**

**Tuesday, April 1 @**
8-8:45 am Pacific Time
5-5:45 pm Central Europe Time
5-5:45 pm Pacific Time
**Wednesday, April 2 @**
8-8:45 am Singapore

To be added to the calendar invite, email Jordan Famularo, jfamularo@semi.org

**Aaron Gress**
VP, Sales US

Risilience

**Jami Haaning**
ESG Director

Lam Research

**Alua Suleimenova**
Senior Sustainability Program Manager

MARVELL

Mark Your Calendars for the 2025 1H Meetings of the:

# SEMI Sustainability Forum

The SSF gathers semiconductor industry professionals and top-tier experts on the world's most pressing sustainability challenges every month.

This forum

- **Creates dialogue** between experts and our industry
- **Transforms global sustainability** hurdles into solutions
- **Explores sustainability-related topics** of interest to the semiconductor value-chain
- **Meets the first week of every month**, alternating between two chosen times tailored for our global membership

**Upcoming Meetings & Themes**

- April 4 | 8-9:30 AM PT | ESG Topics
- May 7 | 4:30-6:00 PM PT | Climate & Emissions

If you have not received a calendar invitations contact Kenneth Guertin at kguertin@semi.org
OR Fill in this form and check 'Sustainability'

semi | S³ STARTUPS FOR SUSTAINABLE SEMICONDUCTORS

*Applications Now Open!*

# 2025 S³ - Startups for Sustainable Semiconductors

A Mentorship and Pitching Opportunity for Sustainability Startups

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semi University

# Circularity Strategies and Waste Regulations for Semiconductor Professionals

An online course to guide you in upcycling spent materials, realizing revenue and lowering liability.


A SEMI Sustainability Initiative Course

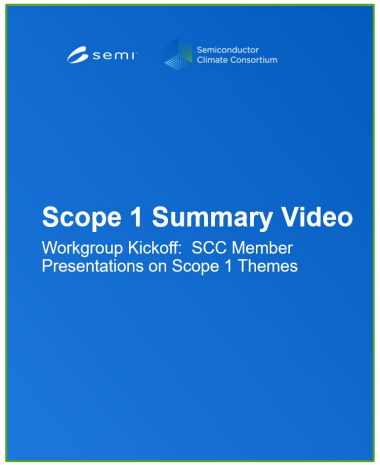
bitly

# New SCC Downloads

**Emissions Reporting Protocol WG: Baseline Research Paper**
Released: December 2024


Member Only

**Scope 1 & Scope 2 Video Compilations**
Member Presentations
Released: October 2024



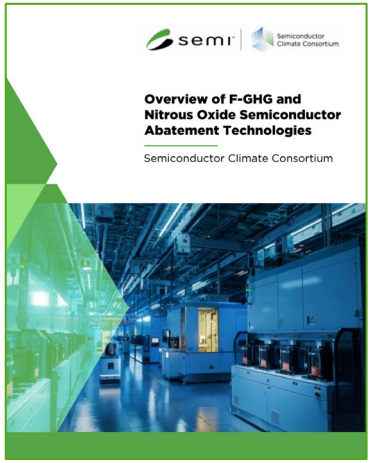

Member Only

Visit your Connect@SEMI portal for links to watch the videos

**Scope 1: Process Gas Evaluation Methods**
Improving Confidence in Reporting GHGs
Released: December 2024


Member Only

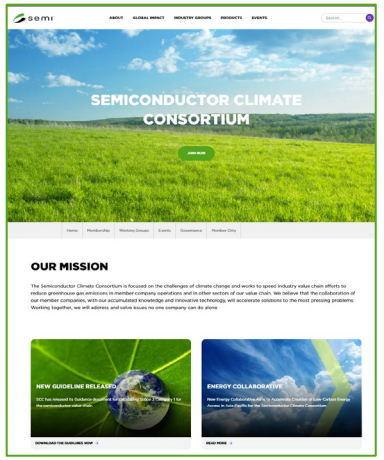
**Scope 1: Overview of F-GHG and Nitrous Oxide Semiconductor Abatement Technologies**
Released: February 2025




**BAR: Digital Technology Impact on Climate**
Toward a shared view of the handprint
Released: February 2025


coming

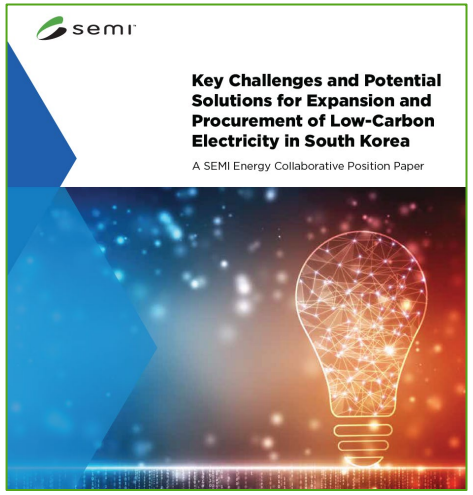
**BAR: Dashboard**
Web interface
Releasing: soon



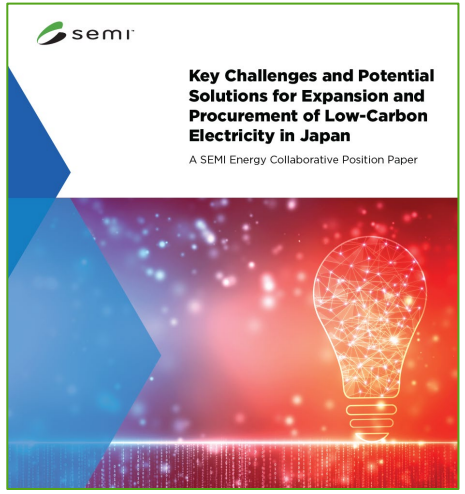

Member Only

# Energy Collaborative LCE Market Reports

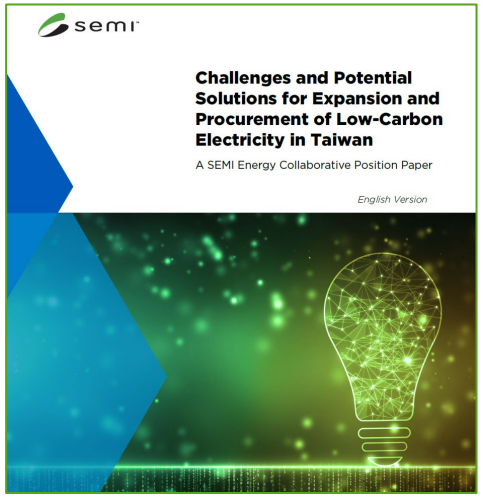
**South Korea**
Released: July 2024



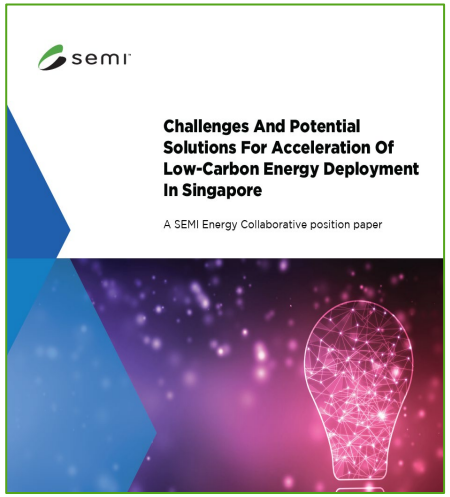

**Japan**
Released: August 2024




**Taiwan**
Released: September 2024




**Singapore**
Released: February 2025




**Malaysia**
Released: soon