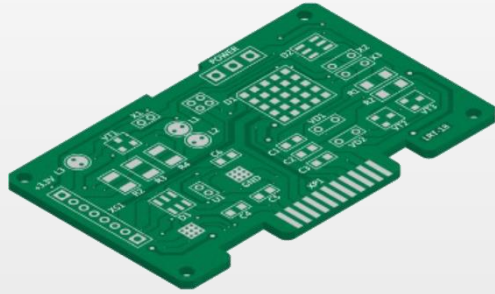


# Elephantech

**1<sup>st</sup> and only mass-producer of inkjet-printed circuit boards making the world sustainable**



# What's PCBs



**Essentials for anything electrified**



**\$90bn market  
&  
CAGR 6%**



# Problems

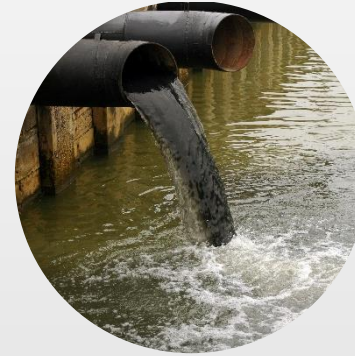
## High environmental impact



**66M** t-CO<sub>2</sub>eq

**0.13** % of global emissions

**2x** bigger than the semiconductor foundry

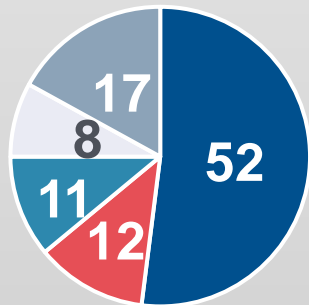


**4M** m<sup>3</sup> of wastewater generated

**High** concentration of hydrochloric acid

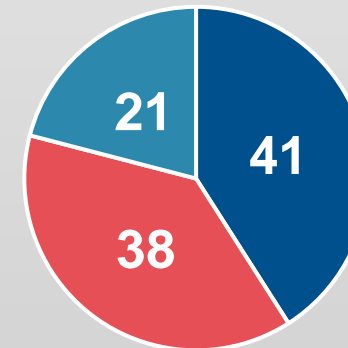
## Geopolitical Risk

**PCBs: Highly dependent on China**



- China
- Taiwan
- South Korea
- Japan
- Other

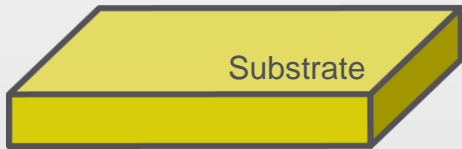
**Palladium** necessary for PCB, and oligopolized



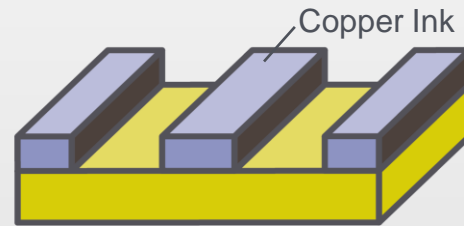
- Russia
- South Africa
- Other

# Pure Additive™ method – Print only where necessary

## Pure Additive™ method

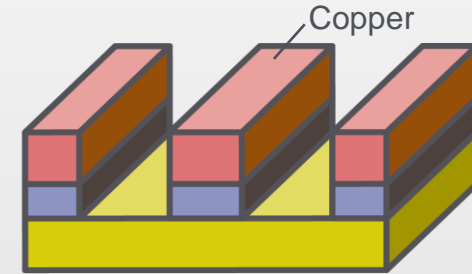


### 1. Printing



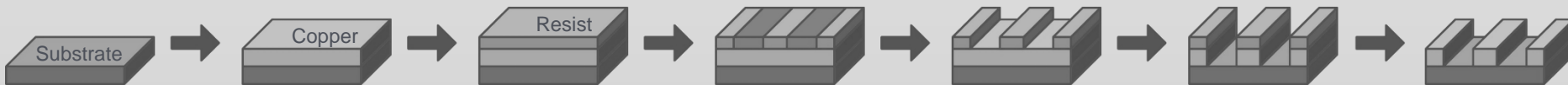
Inkjet prints a thin line of copper as the base for plating

### 2. Plating

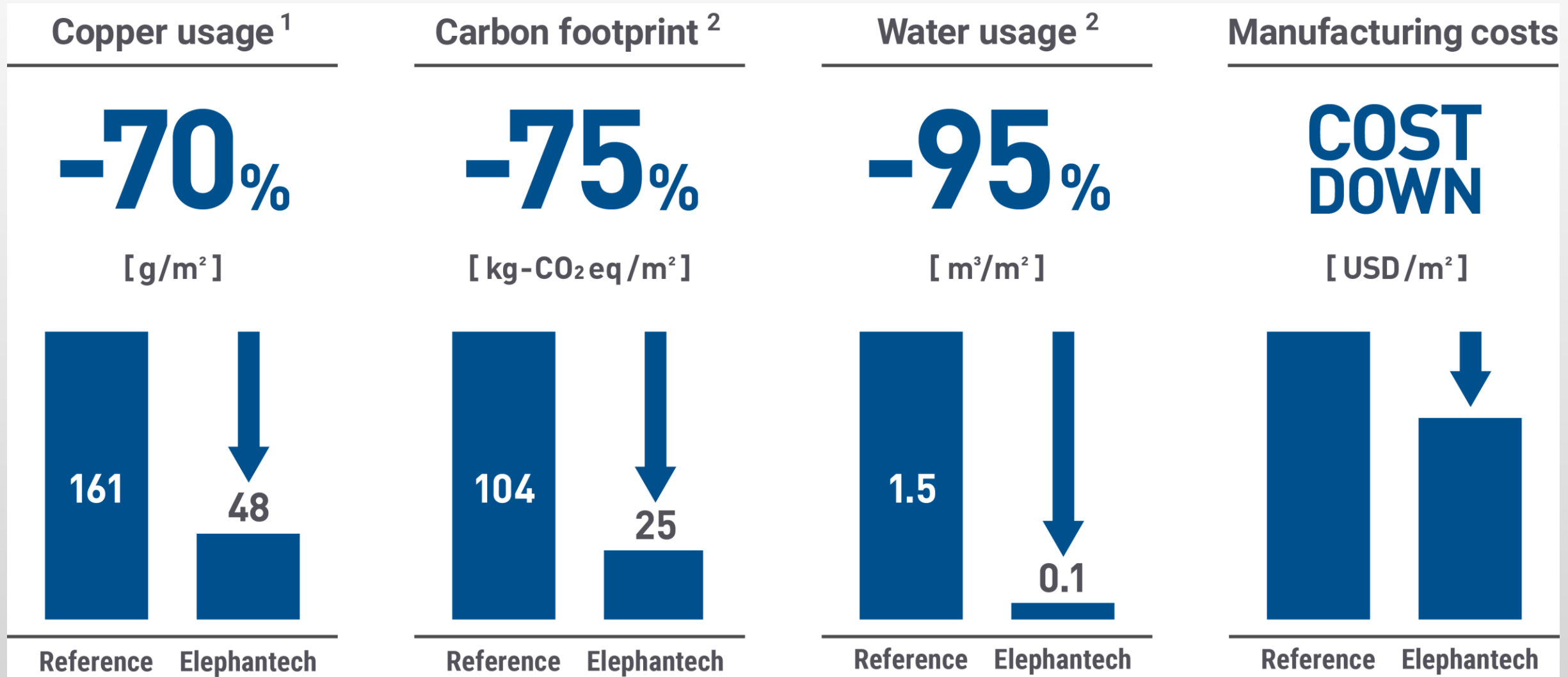


Increase the copper thickness by electroless plating

## Subtractive method



# Make it sustainable without costing additional



1: single layer, 18µm copper, 30% of copper coverage.

2: 2 layers, 6.6µm Cu, 25µm polyimide substrate, 30% copper coverage, 10% gold plating coverage, 0.1µm gold plating. While carbon footprint depends on those parameters, the reduction impact is roughly 75%, ranging from 70% to 80%. In this case, 75% does not precisely equal to the reduction impact and is a rounded value.

# Process is simple & easy to implement

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**Very light wastewater treatment facilities**

**Small equipment footprint**

**Equivalent productivity**

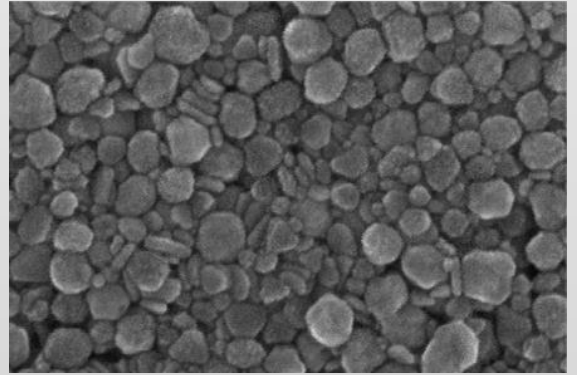
**No chemical etching: Palladium Free**

# Vertically integrated technologies – From copper to PCB



## 1 Nanoparticle Synthesis

Our process yields small and uniform copper nanoparticles essential to the production of stable metal ink.



## 2 Metal Ink Formulation

We convert the nanoparticles into a stable metal ink that is optimized for inkjet printing with a long shelf life.



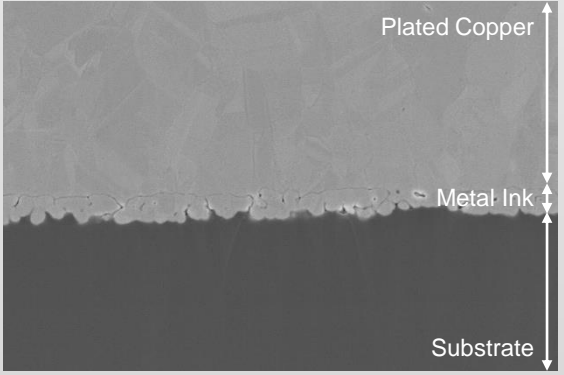
## 3 Metal Inkjet Printing

Our proprietary machinery and printhead control system enables precise inkjet printing of metal ink.



## 4 Electroless Plating

Our advanced high-speed electroless copper plating technology effectively enhances the thickness of the copper layer.



**79** patents applied and **1740** internal technical reports published<sup>1</sup>

# Our factory in Aichi, Japan for mass production

**9 years**  
since foundation

**50M USD**  
fundraised

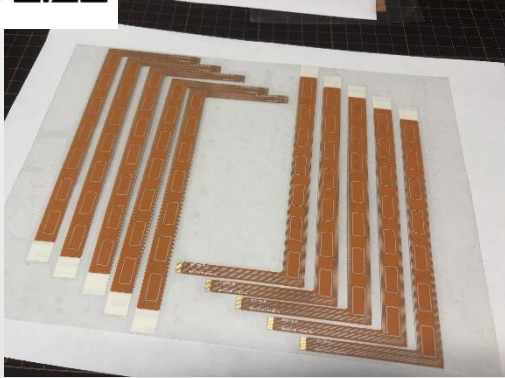
**Mass-production**  
is successfully ongoing





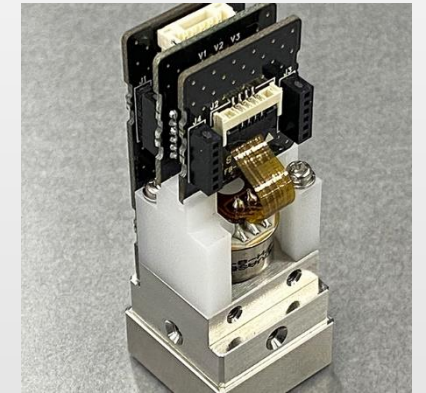
# Mass production examples

## EIZO – Display switches



FlexScan EV3895

## Fukuda – Pressure Sensor Module



**Starting confidential multi-million scale mass-production for Europe customers**

# Great quality. Certificated.

## Quality tests

- ✓ Flex strength test (Sliding test)
  - ✓ Flex strength test (MIT test)
  - ✓ Bending resistance test
  - ✓ High temperature storage test
  - ✓ Highly accelerated stress test (HAST)
  - ✓ Low temperature storage test
  - ✓ High temperature exposure test
  - ✓ Chemical durability test
  - ✓ Ion-migration test
  - ✓ Surface layer withstand voltage test
  - ✓ Thermal shock test
  - ✓ Peel strength test
- More details in the Appendix

## Certificates

- ✓ ISO9001:2015
- ✓ ISO14001:2015
- ✓ UL94 V-0



## Compliance

- ✓ RoHS

# Improving product specifications and developing Inkjet system while expanding sales worldwide.

2023~2024

Single side

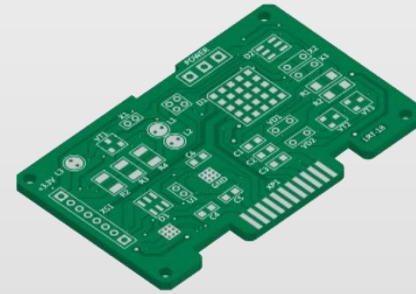


2025

Double side



Double side



System



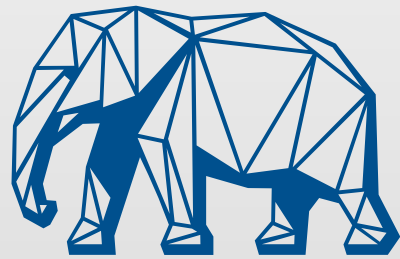
# We would like to

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**Meet with potential customers/business partners** who are interested in our technology and considering implementing it.

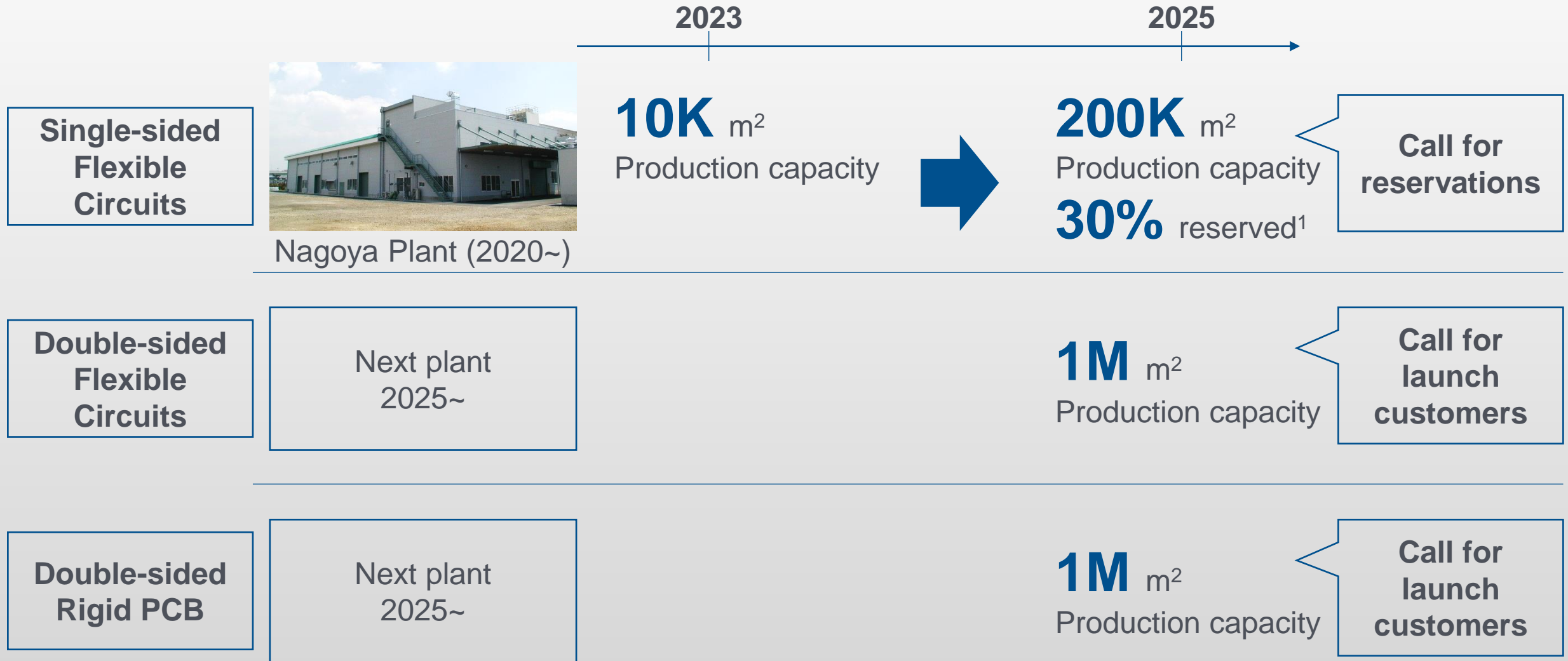
&

**Meet with investors** for the next round of funding.



# Elephantech

# We are rapidly deploying our sustainable PCBs



Also planning to sell the printers and to develop multilayers

# Strategic business partners and shareholders

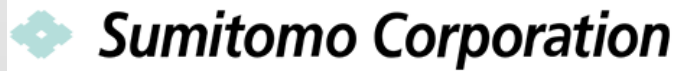
## Strategic business partners



Partnership on inkjet printing technology



Mass production support and material supply



International marketing and sales



Co-development of IMPC®

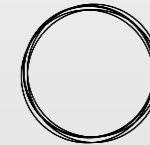


Material supply

## Other shareholders



Beyond Next Ventures



anri



JICN  
JAPAN GREEN INVESTMENT CORP. FOR  
CARBON NEUTRALITY



ME Innovation Fund

... and more

# We are the only one replacing existing PCBs

## Startups



- Not yet mass-producing (Mass-producing is challenging for startups)
- Not really trying to replace existing PCBs (because it's unattractive to VCs)

## Incumbents



- Incumbent PCB manufacturers generally have neither material nor equipment technology.
- No capability, no motivation to disrupt the existing industry.



- Committed to replace existing PCBs with a low-carbon alternative
- Already mass-producing and used for electronics manufacturing



# Leadership team

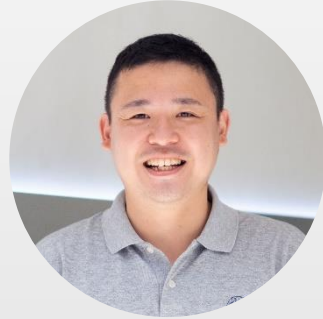
## Founders



**Shinya Shimizu**

Co-Founder / Managing Director / CEO & CTO

## Management Team



**Satoshi Konagai**

COO /  
General Manager, Sales



**Hiroaki Nasu**

General Manager,  
Engineering



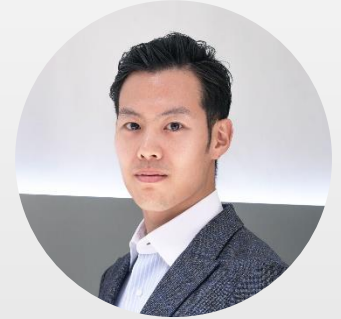
**Naohiro Hirata**

General Manager,  
Manufacturing



**Keita Sakimura**

General Manager,  
Corporate



**Keisuke Ito**

General Manager,  
CEO office

## Independent Directors

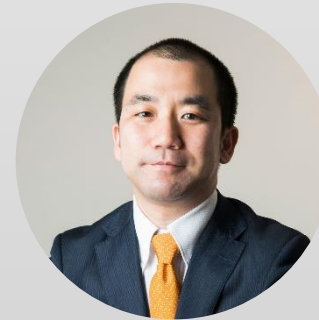


**Masaaki Sugimoto**

Co-Founder / Director / SVP



**Tomihisa  
Kamada**



**Kengo Ueha**



**Masahiro  
Sameshima**



**Kazuhiko Noda**

## Corporate Auditor

# Key characteristics – Pure Additive™ method



## Minimal process required

Just inkjet printing and metal plating – neither etching nor exposure processes are required.

## Environment Friendly

The Pure Additive™ method reduces carbon footprint by 75% and water usage by 95%.

## Reliable Printed Circuit Boards

The Pure Additive™ method has been in mass production for several years and our products are commercially used.

# Locations



## Hatchobori office

Headquarters and prototyping plant

4-3-8 Hatchobori, Chuo, Tokyo 104-0032, Japan



## Shinkiba R&D center

R&D of materials and the inkjet printing system

1-3-14 Shinkiba, Koto, Tokyo 136-0082, Japan



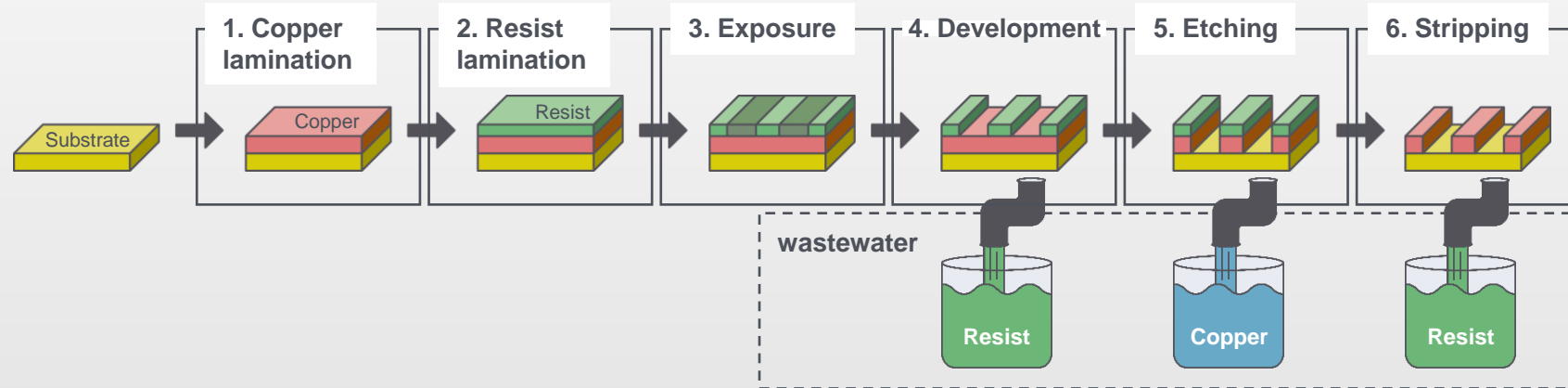
## AMC Nagoya

Additive Manufacturing Center/Mass production plant

2-1 Tango-dori, Minami, Nagoya, Aichi 457-0801, Japan  
(Located in Mitsui Chemicals Inc. Nagoya Works)

# The PCB industry poses huge environmental impacts

**Subtractive method:** a Wasteful standard of printed circuit boards production



## 1. Greenhouse Gas Emissions



**66M** t-CO<sub>2</sub>eq, **0.13%** of global emissions<sup>1</sup>

**2x** bigger than the semiconductor foundry<sup>2</sup>

**10%** of emissions from Apple's manufacturing<sup>3</sup>

**\$4.4B** of potential carbon costs<sup>4</sup>

## 2. Wastewater Pollution



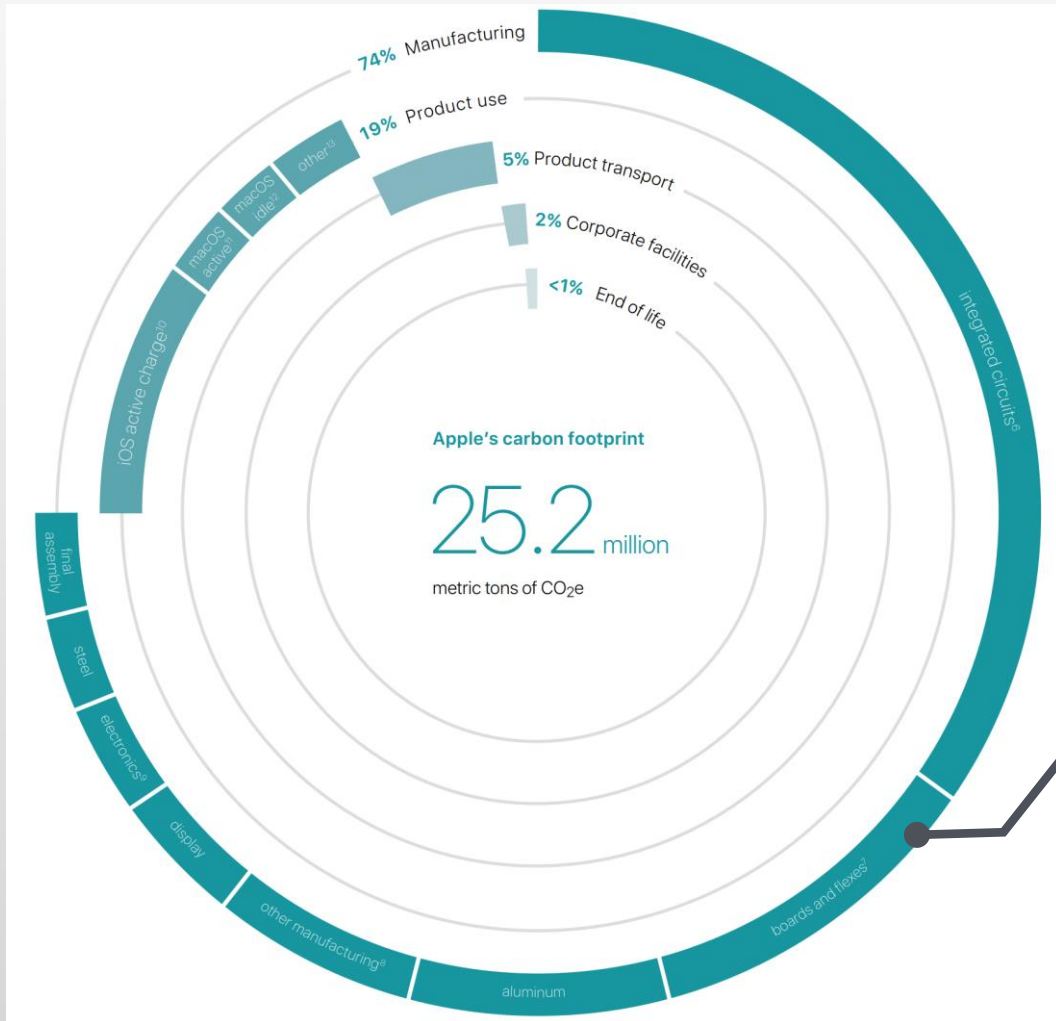
**4M** m<sup>3</sup> of wastewater generated<sup>5</sup>

**140,000** tons of copper contained

**10~15** wt% of copper concentration

**High** concentration of hydrochloric acid

# 10% of Apple's manufacturing emission comes from bare PCBs



*“In 2020, we’ve made clear gains with our work on integrated circuits and boards and flexes—components we’ve prioritized because they are carbon-intensive.”*

*Apple Environmental Progress Report 2021*

**10%** of total manufacturing carbon footprint comes from boards and flexes

Source: Apple Environmental Responsibility Report 2019

# Introducing a versatile technology: metal nanoparticle inkjet printing for a variety of applications, starting with PCB production

## Elephantech Core business

### Printed Circuit Board (PCB)

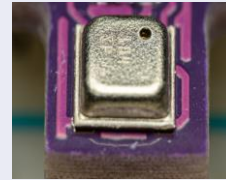


回路基板

- **\$90bn** market growing with 6% CAGR
- **Essential for anything electrified** (e.g., Smartphones, PC, Automotives)
- Responsible for **0.1% of total greenhouse gas(GHG) emissions**

## Potential metal inkjet printing applications

### MEMS



### MLCC



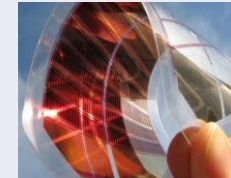
### Display



### Touch Panel



### Solar Cell



### Battery



### Electromagnetic Shielding



### RFID



### Biosensor

