

XZERO
everything to zero



**Xzero - driving return of investment in the semiconductor industry
by removing EVERYTHING from chip processing water**

Company purpose

Xzero mission: enabling further miniaturization of chips, leading to revolutionizing the state-of-the art in **medicine, electronics, ICT, transport, energy, national security** or **space** by:

- Commercializing innovative proprietary **thermal pervaporation technology** which, in only **two steps**, purifies water beyond the level of legacy technologies.
- Addressing key pain points of bleeding-edge semiconductor manufacturers - **nano particles** (called „**killer particles**“) in the **chip rinsing water**.
- Driving **higher yields** in manufacturing in this strategically important sector (**80% of the lost yield** comes from impurities in air and water)
- Becoming integrated part of the European semiconductor ecosystem and **major supplier** of water purification systems for **world leaders (Intel, Global Foundries, Samsung, TSMC)**, improving **ROI** on exuberant **CapEx** of the foundries.



Global semiconductor arms race is accelerating NOW

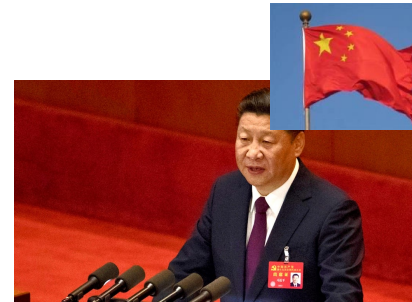
Industrial, technological and European security leadership is at stake.



- Intel - €80 billion investment in EU
- The European Chips Act – 2022
- EIC Accelerator focus



- Congress USD 52 billion support bill & 25% tax reduction
- Core of US plan to regain the tech lead
- TSMC foundry USD 12 billion factory



- USD 150 billion gvt. support program
- USD 1 trillion over next 10 yrs
- Key strategic focus



- Market leaders Samsung and TSMC
- TSMC – USD 100 billion on CapEx and R&D spending

More crucial than ever – European independence and sovereignty.



WHY NOW

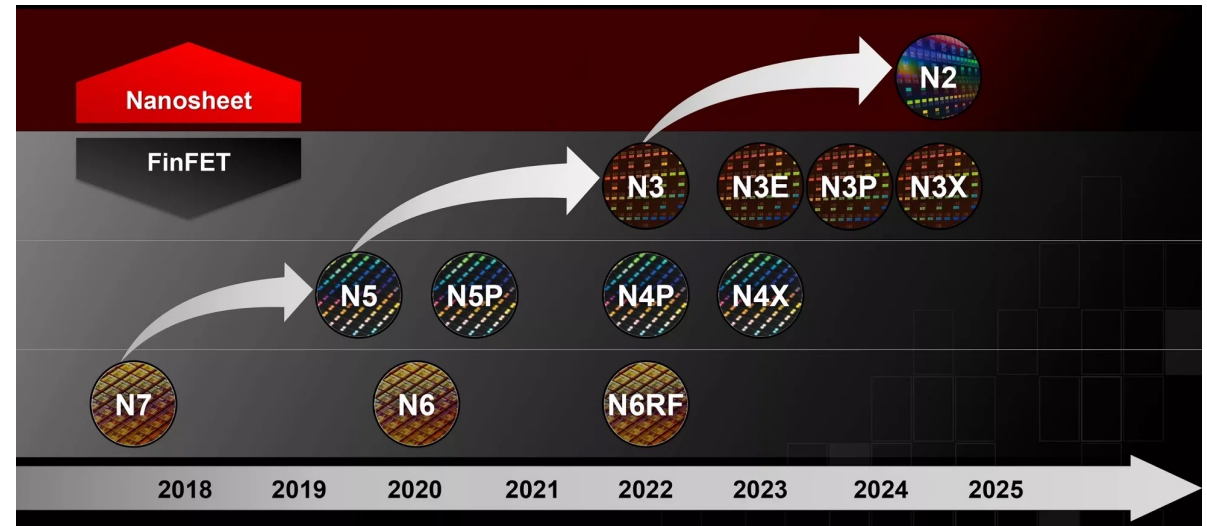
“The aim is to create a state-of-the-art European chip ecosystem, including production”

Ursula von der Leyen, President of the European Commission

Problem and proposed solution

Problem: miniaturization of integrated circuits enabling **lower energy consumption** and **increased processing power** of semiconductor chips is limited by:

- **contaminants** in air and water that are responsible for approx. **80% of lost yield** in nano-chips production.
- Lower than required yield puts stress on **profitability** and use of **precious resources**.



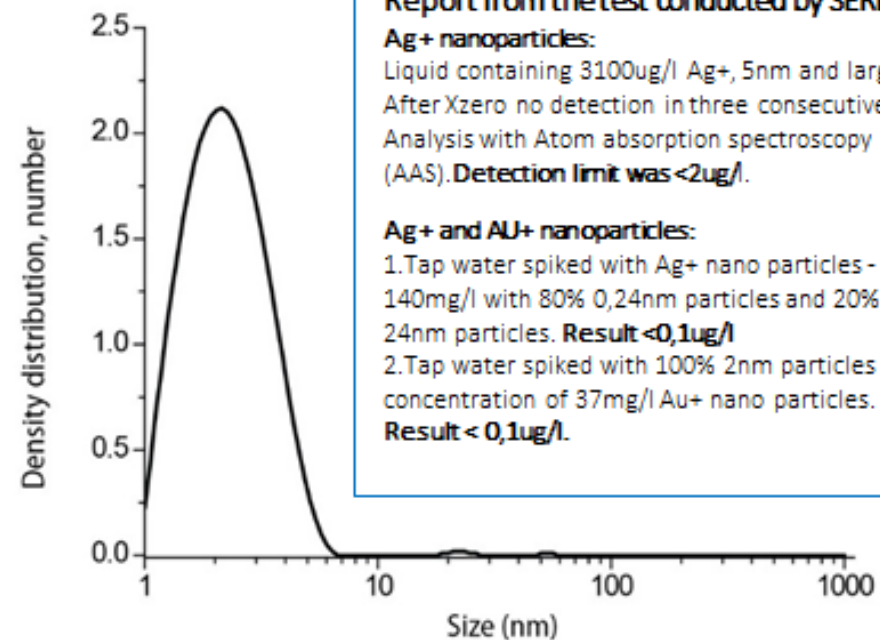
Solution:

- **free from nano-particles semiconductor processing water** produced with the use of Xzero's **proprietary thermal pervaporation technology**;
- enabling **not yet achievable** levels of water purity required by industry;
- potential to keep evolving with the semiconductor industry as it moves into the **angstrom era** (1/10 of a nanometer).

Innovation and technology

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- Xzero is mimicking a natural phenomena: the ability to fully remove **EVERYTHING** from water. **Even one carbon atom.**
- **Patented technology:** IPQ12096 - Membrane Package, IPQ12097 – Ultra Pure Water System & Control.
- Levels of purification (even **below 2nm**) amazes industry experts



Report from the test conducted by SERI (2014)

Ag+ nanoparticles:

Liquid containing 3100ug/l Ag+, 5nm and larger.
After Xzero no detection in three consecutive tests.
Analysis with Atom absorption spectroscopy (AAS). **Detection limit was <2ug/l.**

Ag+ and AU+ nanoparticles:

1. Tap water spiked with Ag+ nano particles - 140mg/l with 80% 0,24nm particles and 20% 1-24nm particles. **Result <0,1ug/l**
2. Tap water spiked with 100% 2nm particles at a concentration of 37mg/l Au+ nano particles. **Result <0,1ug/l.**

The graph shows the nano particles added to water before Xzero test.
Following the test particular matter was below detection level

Key Enabling Technology for semiconductor industry.



KTH Royal Institute
of Technology

umec

Gaining The Momentum. Everything circles around circuits.

European Chips Act aims to **regain Europe's lost ground** in the semiconductor industry and **secure Europe's supply** of semiconductors. Today 10% of global chip production is from the EU. The **target is 20%**.

- Xzero has made the first prototype test with real industrial feeds and industry measuring equipment at Sandia Laboratories, proving **superior to state-of-the-art**. However, historically there was no need for process water with that level of purity.
- As chips technology nodes reached **20 nm**, the foundries signaled interest for **purier water** – especially the **removal of nanoparticles**.
- To date more than **10 million EUR** of private and public funds and **20 years** of top-level R&D know-how at Xzero have been invested.
- After several test units and prototypes, we are now preparing to build our **first online pilot** and **scaleup** in cooperation with one of the world's leading semiconductor industries.

We have a large **lead in know-how** and **protected proprietary solutions**.

Competition and value proposition



State-of-the-art: 15-20 steps of purification using multiple technologies
-> level of purity (5-10nm)

CapEx
€15,800/liter/h



Xzero value proposition: only TWO step of water purification using ONE technology
-> level of purity below 2nm

CapEx
€10,000/liter/h



- **Consistently Purer** - can remove all contaminants, always
- **Simple and compact**- uses far fewer steps than existing systems
- **Economical** - lower capital and operating costs
- **Zero discharge** - can recirculate water to reduce total water consumption

Market opportunity

Tier I customers – Bleeding edge

Risk- and low-yield mass manufacturing



Tier II customers

Mature manufacturing

Med-high yield

PILOT WITH INTEL IN 2023

- Total UPW equipment estimated to 2,7billion USD in 2022 and expected to increase to 3,7 bilion USD by 2027.
- Total semiconductor CapEx in 2022 is expected to USD 186 billion.

Business model & value chain

Engineering partner

Utilities to support
Actual brick'n mortar building
to house the system

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Sales- and influencing activities by Xzero to create pull

Financial transaction, support and knowledge transfer

Alternative financial transaction



Component Wholesaler

System Integrator

Foundry
(manufacturer*)

order

order

- Manufacturing of modules
- Stack and assemble complete racks
- Pre- & post module peripherals

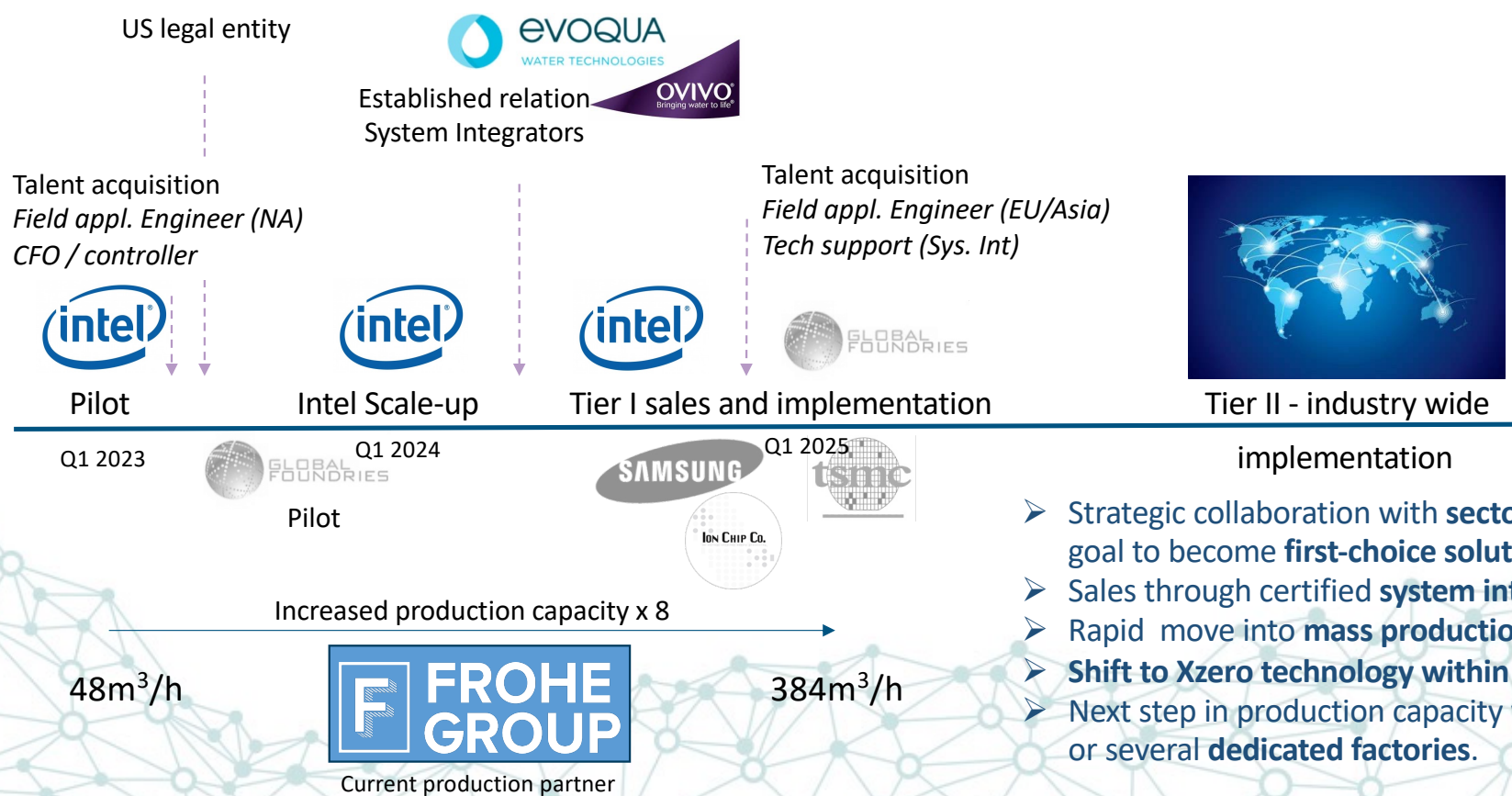
Std solution hardware
Logistics



Established **partner/supplier** (will be chosen by Foundry)

- Design
- Assembly and installation
- Service and maintenance
- Total solution responsibility

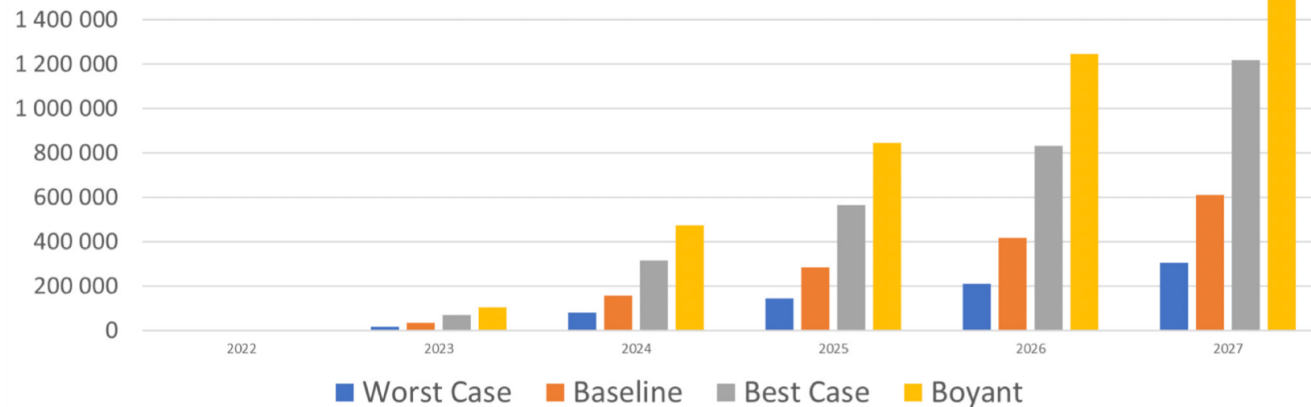
Commercialization strategy – scaling the business



- Strategic collaboration with **sector leaders** with goal to become **first-choice solution supplier**
- Sales through certified **system integrators**
- Rapid move into **mass production**
- **Shift to Xzero technology within 2-5 years.**
- Next step in production capacity will require one or several **dedicated factories.**

Financial projections

TSEK



EIC Accelerator & private Equity – 2023 - € 18 million

Investments to date - €10 million

Use of additional equity funds

- Scaling production capacity to meet demand
- Pilot testing with Intel and other foundries
- Scaling the organization for size and commercialization
- Drive continuous development of Xzero technology

Xzero aims to become an integrated part of the European and global semiconductor industry

Xzero Team



Andreas Törnblom
CEO

Previous CEO of Transrail
Master of Technology,
Chalmers University of
Technology



Aapo Säask
Founder & Chairman

Entrepreneur
Master of Business, Stockholm
University



Miriam Åslin
Operational Director

**Project Leader, for 18
years developing Xzero
projects.**
Master of Science,
Stockholm University



Alexander Fornsäter
CTO

**Product and production
development**
Master of Technology,
Royal Institute of
Technology, Stockholm



Joakim Hansson
Business Development

**Roles as CEO with focus on
business development**
Degree in Finance &
Economics

- **Entrepreneurs, scientists and industry experts** from: chemical engineering, mechanical engineering, product development, production, product commercialization, and management
- **Scientific validation:** *imec*, Royal Institute of Technology (KTH), Swedish Environmental Research Institute, Clarkson University, ALS Global, Anton Paar and Manta Inc.)
- **Established network of institutes;** cooperation with **Andrew Martin, Professor at KTH** Royal Institute of Technology, Department of Energy Technology and **Frank Holsteys, Doctor of Engineering, Head of Department at imec.**

Conclusion

Xzero is introducing a game-changing technology designed to:



- Strengthen the European chip ecosystem
 - Technological edge into angstrom era
 - Secure supply chain
- Enable water purity for strict requirements today and into the “angstrom” era of sub nanometer chips
- Drive semiconductor yield and re-investments in Europe
- Become preferred UPW supplier for semiconductor industry: net sales of 45 million EUR by 2025 and more than 100 million EUR in 2030

„When we realize that independence and sovereignty of future generations of Europeans is at stake, all other investments will loose in significance“.

Aapo Säask, Chairman & Founder



Driving semiconductor yield and re-investments in Europe