



CAMBRIDGE GaN DEVICES

GaN for a Sustainable Future

GSA International Semiconductor Conference – 13th March 2024



camgandevices.com

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4 MEGATRENDS AFFECTING SEMICONDUCTORS

The industry will double in the decade and reach **\$1Tn** by 2030



1

Climate change

- ▶ Electrification → renewable energy & eMobility
- ▶ Semiconductors to convert, transfer and store the energy

2

Digital transformation

- ▶ Digitisation → AI, ML, IoT and Big Data to drive digital transformation
- ▶ Semiconductors for higher computation power

3

Urbanisation

- ▶ From 2018 to 2050, global urban population is expected to grow from **55** to **68%**
- ▶ Semiconductors to enable smart cities, infrastructure and connectivity

4

Demographics

- ▶ Global population to reach ~**9.8Bn** in 2050
- ▶ Increased consumption of consumer electronics

Energy Consumption to Increase 14% by 2050

Electricity to Count for Over **40%** of the Total Energy Consumption

4810

mTJ

2019

VS

490

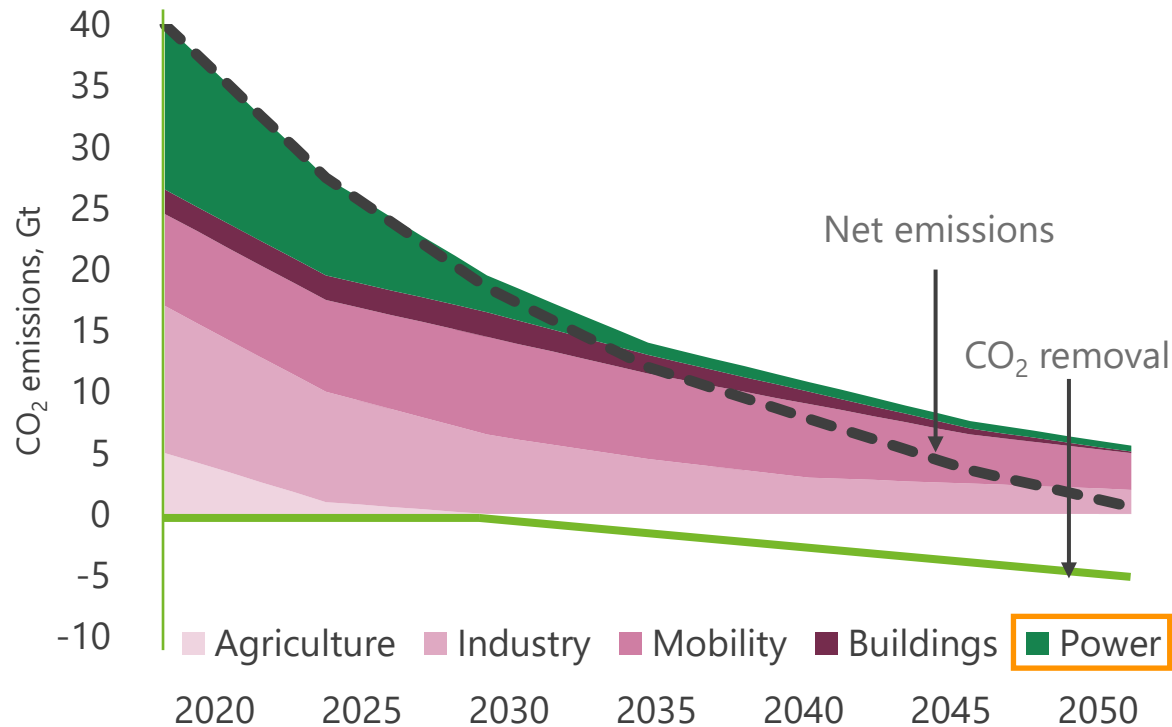
mTJ

2050

The World Must Go for Net-zero

Drastically Reduce Emissions Plus Removal

Net-zero 2050 scenario from NGFS*



<1.5°C

2050

Temperature Increase target

0 CO₂ Net Emissions

3 Areas Driving the Growth of Energy-Efficient Solutions in Power



1. ELECTRIFICATION

The **e-mobility** disruption, energy efficiency regulations and CO₂ reduction emissions targets will drive change



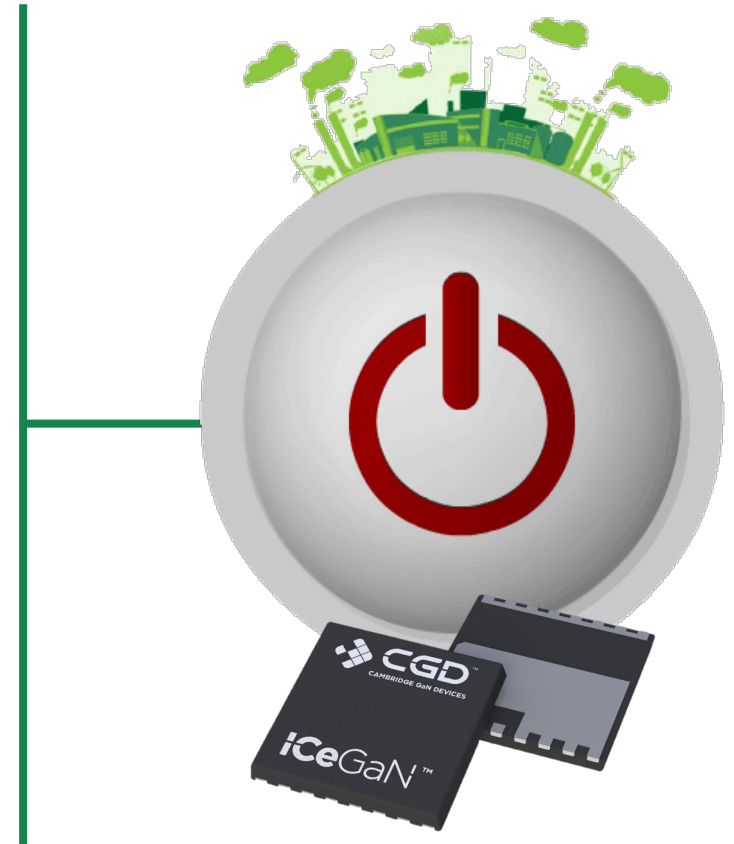
2. RENEWABLE ENERGIES

Wind and **Solar** power expected to account for 50% of the power mix by 2030 and 85% by 2050



3. CONNECTIVITY

AI, Cloud Computing and **5G** full deployment will continue a 3-digit growth



Power Semiconductors are the Core of Energy Conversion and Control

GaN's Clear Advantages in Power Devices

3x
Higher **POWER DENSITY**

3x
More **COMPACT**

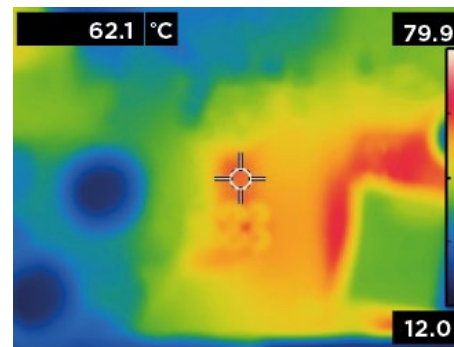
99%
ENERGY EFFICIENCY

60%
FASTER CHARGING

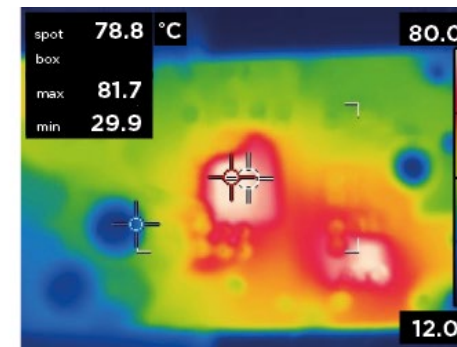
iCeGaN™
Runs **~20°C**
cooler than Silicon

iCeGaN™ thermal comparison vs Silicon.

GaN



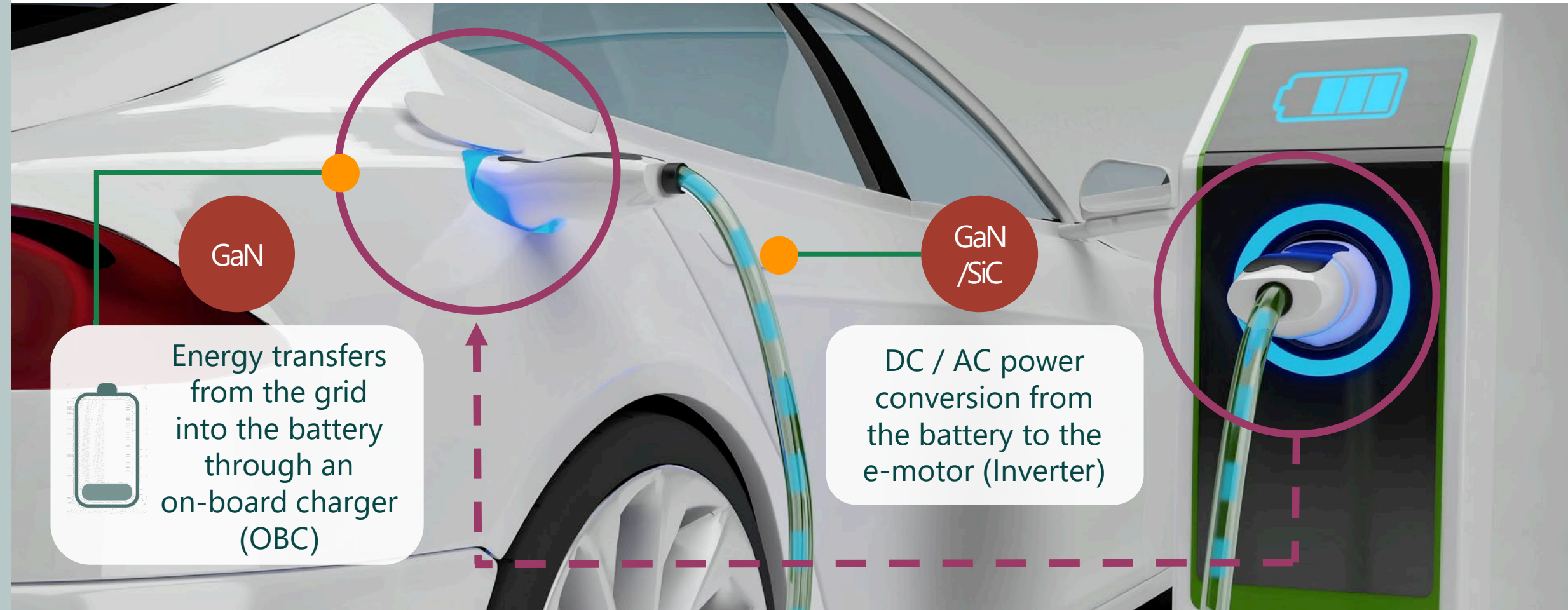
Silicon



WBG Materials Will Ease the Opening of a New Mobility Frontier

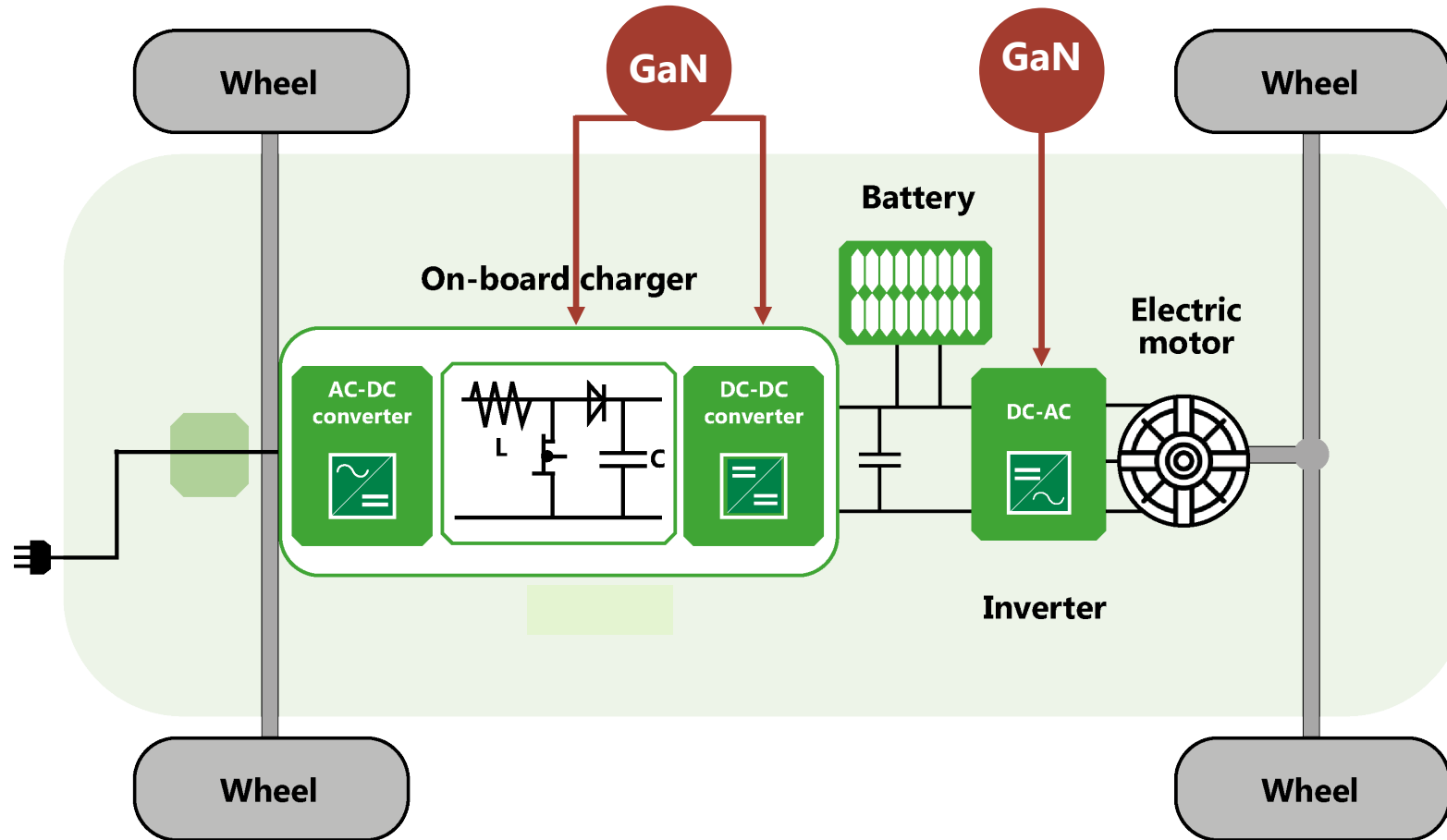


With Energy-Efficient Materials, E-vehicles are Expected to Reach **40M units** by 2030



WBG Materials Will Ease the Opening of a New Mobility Frontier

Block Diagram Example



Renewables to Account for 85% of the Power Mix by 2050



GaN Delivers Highest Efficiency in Power Conversion

GaN

DC / AC power conversion from the solar panel to the grid (Inverter)



Sources: McKinsey Global Energy Perspective 2022 Executive Summary

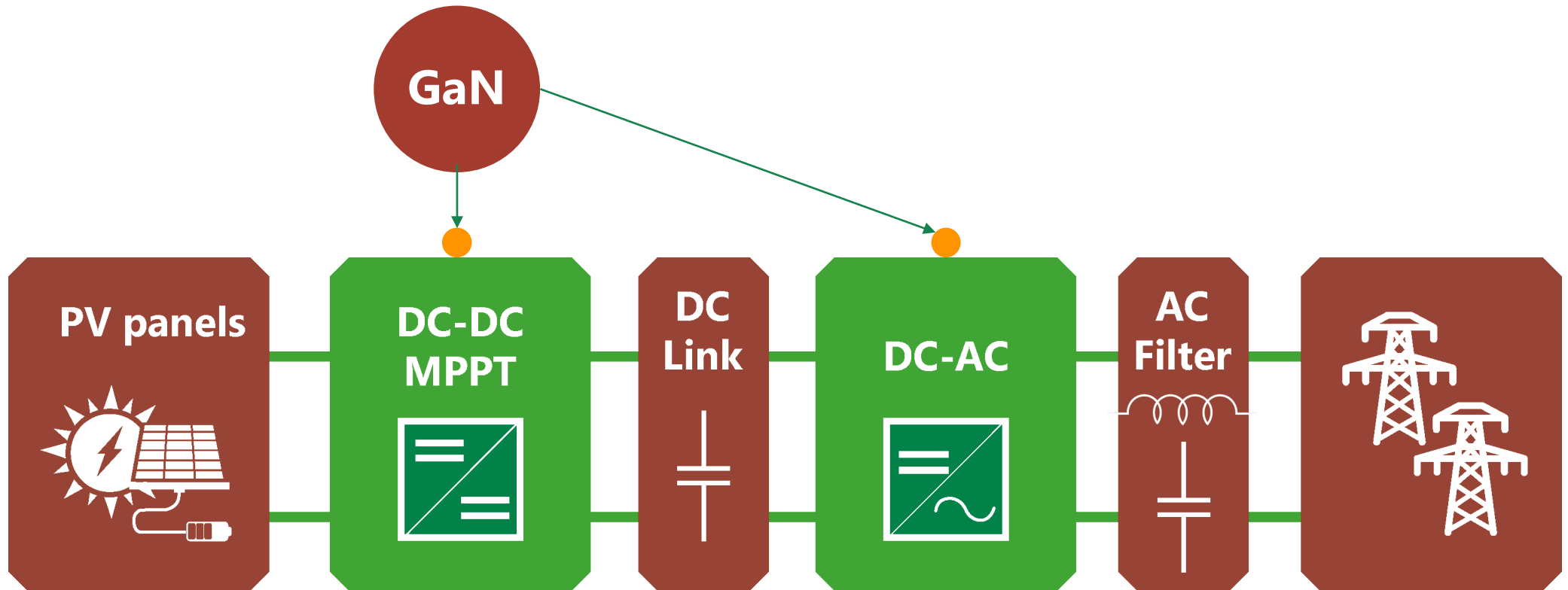
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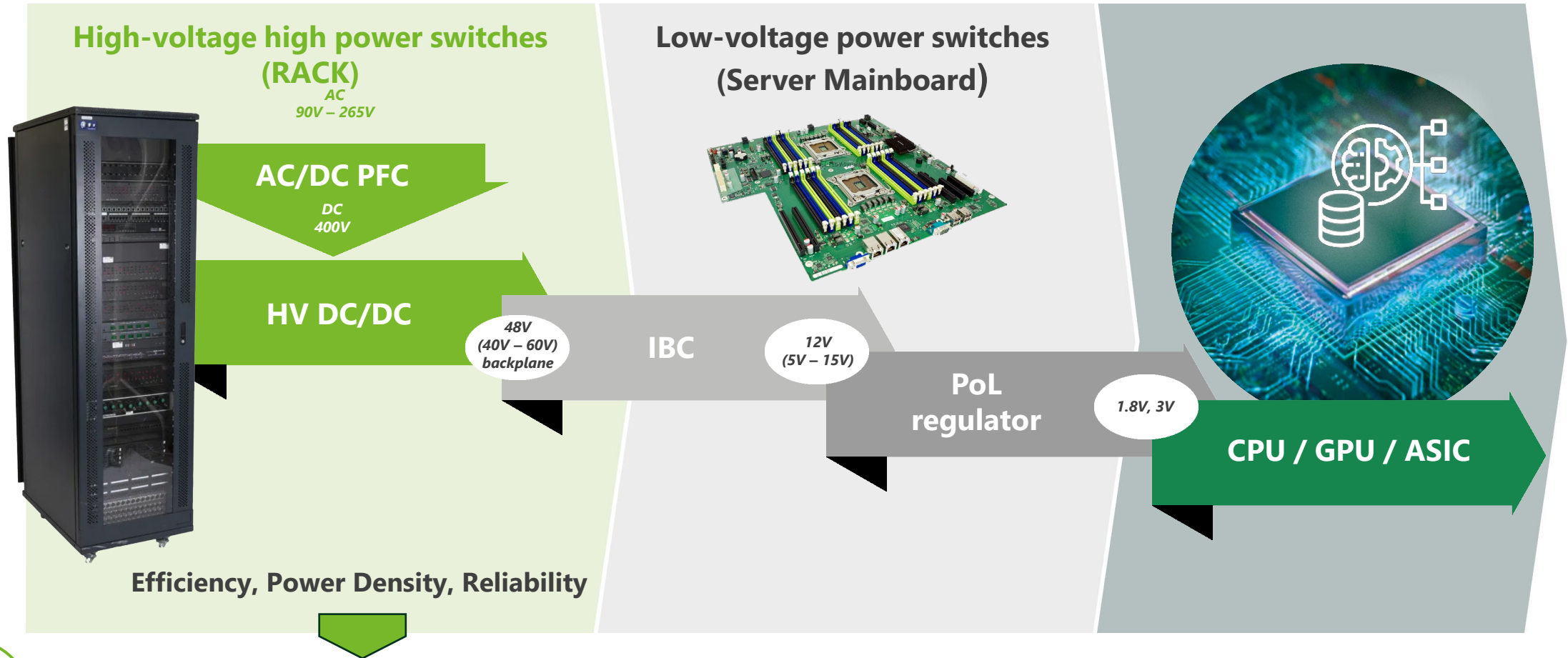
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GaN Delivers Highest Efficiency in Power Conversion

Block Diagram Example



Datacentre Power Supply Architecture



GaN delivers -40% Energy losses



What if All Data Centres Were to Adopt GaN

Green house emissions from



Carbon sequestered by



Green house emissions avoided by



54,911,044
Barrels of oil consumed

4,619,368
Homes' electricity use for one year

28,311,399
Acres of U.S. forests in one year

5,283,061
Gasoline-powered passenger vehicles driven for one year

8,214,831
Tons of waste recycled instead of landfilled

33.5TWh saved in a year – 23,700,000 tons of CO₂ - \$3.3b electricity bill saving

Global Economies Have Established Energy Efficiency Reduction Policies To Achieve net-zero CO₂ Emission By 2050

Resources scarcity, growing energy consumption, and security of supply call for a **national semiconductor strategy** substantiated by significant investments on energy-efficient semiconductors.



Global Landscape

Compound semi global investments
CAGR% 8% - 10%⁽¹⁾



A booming industry investing over **700bn\$** in the past 12 months

The UK national semiconductor strategy priorities

- 1** Grow the UK sector-building on existing strengths in design and R&D
- 2** Strengthen the UK sector to improve the resilience of global supply chains
- 3** Protect from cyber-security threats of semiconductors used across the UK

Cambridge GaN Devices at a Glance

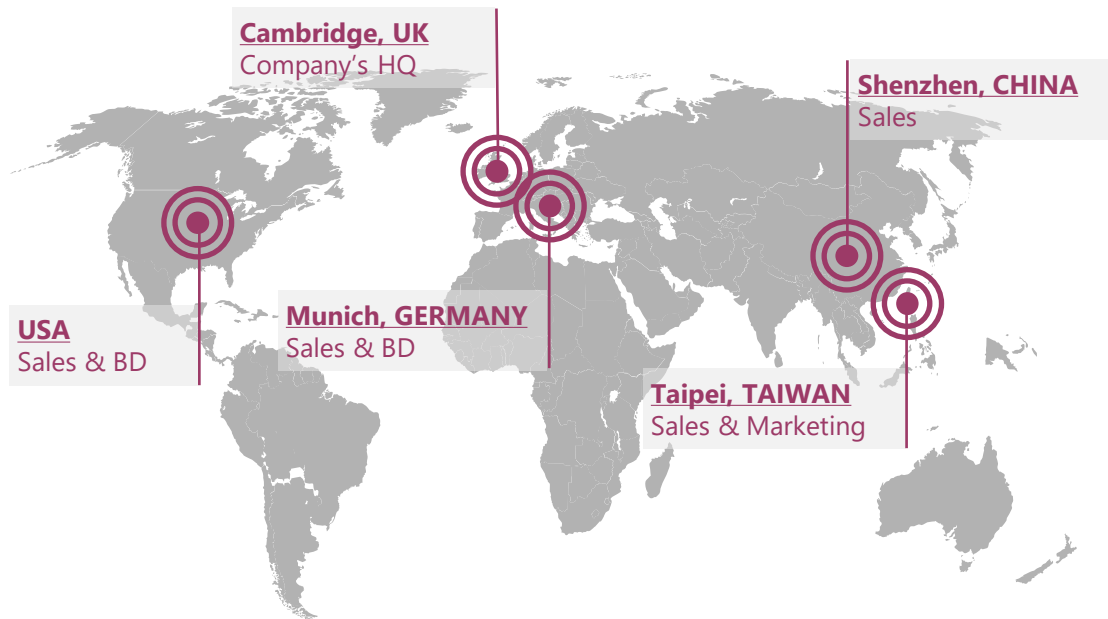
The Fast-paced Scaleup Making Green Electronics Possible

A fabless semiconductor company designing, developing and commercialising **energy-efficient GaN-based power devices and ICs**

Operating from
5
Locations

Innovation
91+
Patent applications

Employees
~60
> 300% growth (2020–2023)



Knowledge

Academic excellence and industry expertise combined



Innovation

Innovative power solutions that help protect the environment



Sustainability

Eco-compatible business measures (**ESG**)



Collaboration

Cooperation, empowerment, respect, listening to customers, employees and partners

CGD and GaN as sustainability leaders



GaN is the most sustainable material to address global challenges and disrupt the future of power electronics



Enabling mass electrification



GaN is more efficient than silicon



3x higher power density reducing DC infrastructure



More sustainable process

How CGD is scaling sustainability

SUSTAINABILITY AND INNOVATION

✓ **Founding core principal**

ENVIRONMENTAL MANAGEMENT

✓ **Commitment to Net Zero Action through SME Climate Hub Pledge**

✓ **ISO 14001 accreditation**

✓ **ESG Committee**

GaN technology will enable 10% of the 26Gt CO₂ reductions needed for Net Zero by 2050

“
*With great power comes great
responsibility.*
”





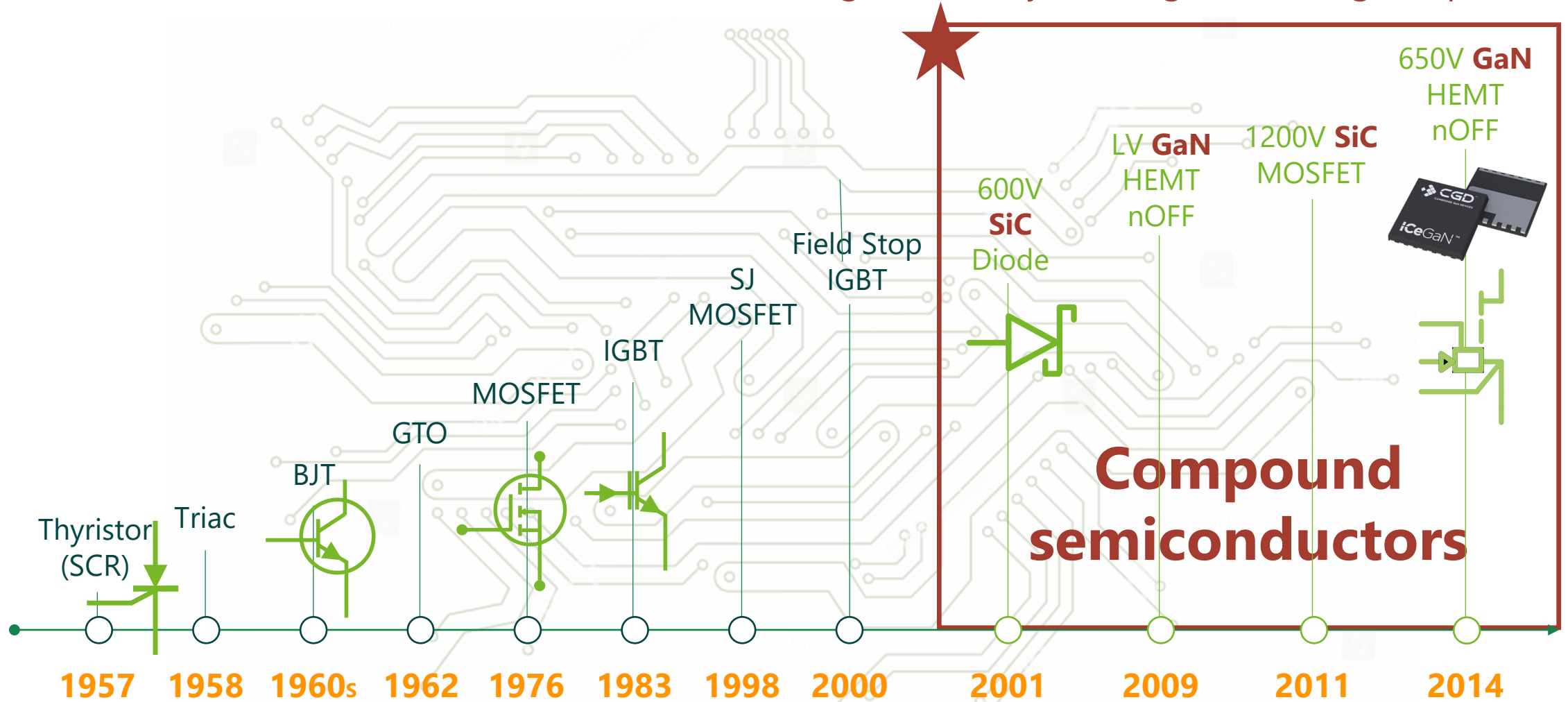
CGD[™]

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Dare to innovate differently

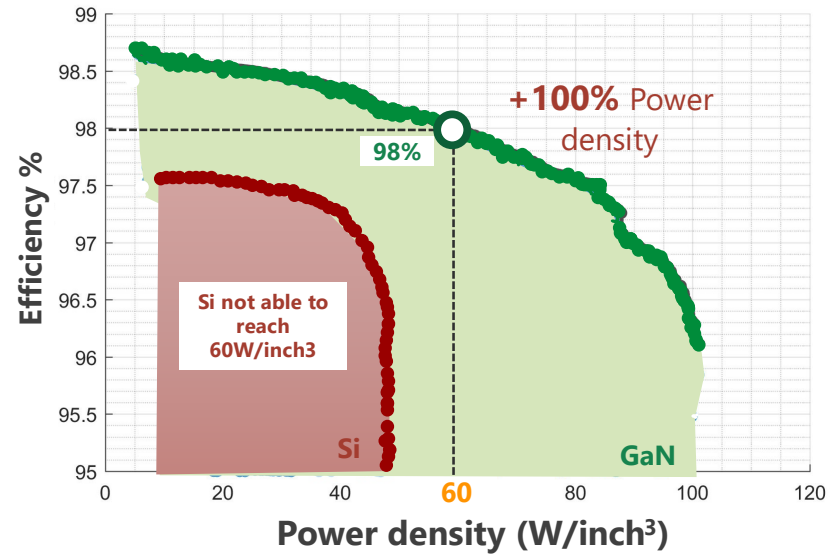
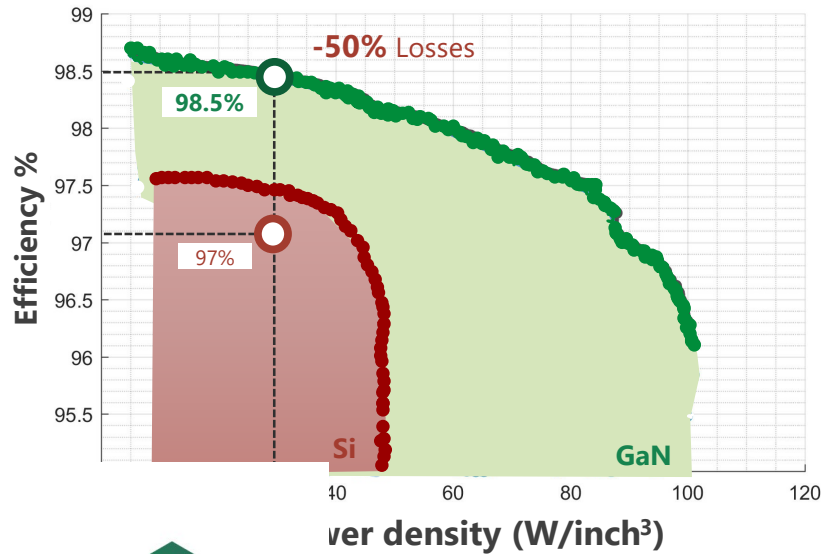
Timeline of the Introduction of Modern Power Devices

Novel Power Semiconductor Materials Enable High Efficiency and High Switching Frequencies



Sources: MDPI - Overview of Power Electronic Switches: A Summary of the Past – Dec. 2020

A Power Supply with GaN is More Energy Efficient and Can Achieve Higher Power Density



iCeGaN™
Runs ~20°C cooler than Silicon

iCeGaN™ thermal comparison in 65W QR Flyback vs Silicon.

