

# NOMURA

*Next-Generation  
Gallium Nitride Semiconductor  
Accelerates Carbon Neutrality*



**Dan Kinzer, Co-Founder, COO / CTO**  
[dan.kinzer@navitassemi.com](mailto:dan.kinzer@navitassemi.com)



# Navitas

*Energy • Efficiency • Sustainability*

**Nasdaq : NVTS**



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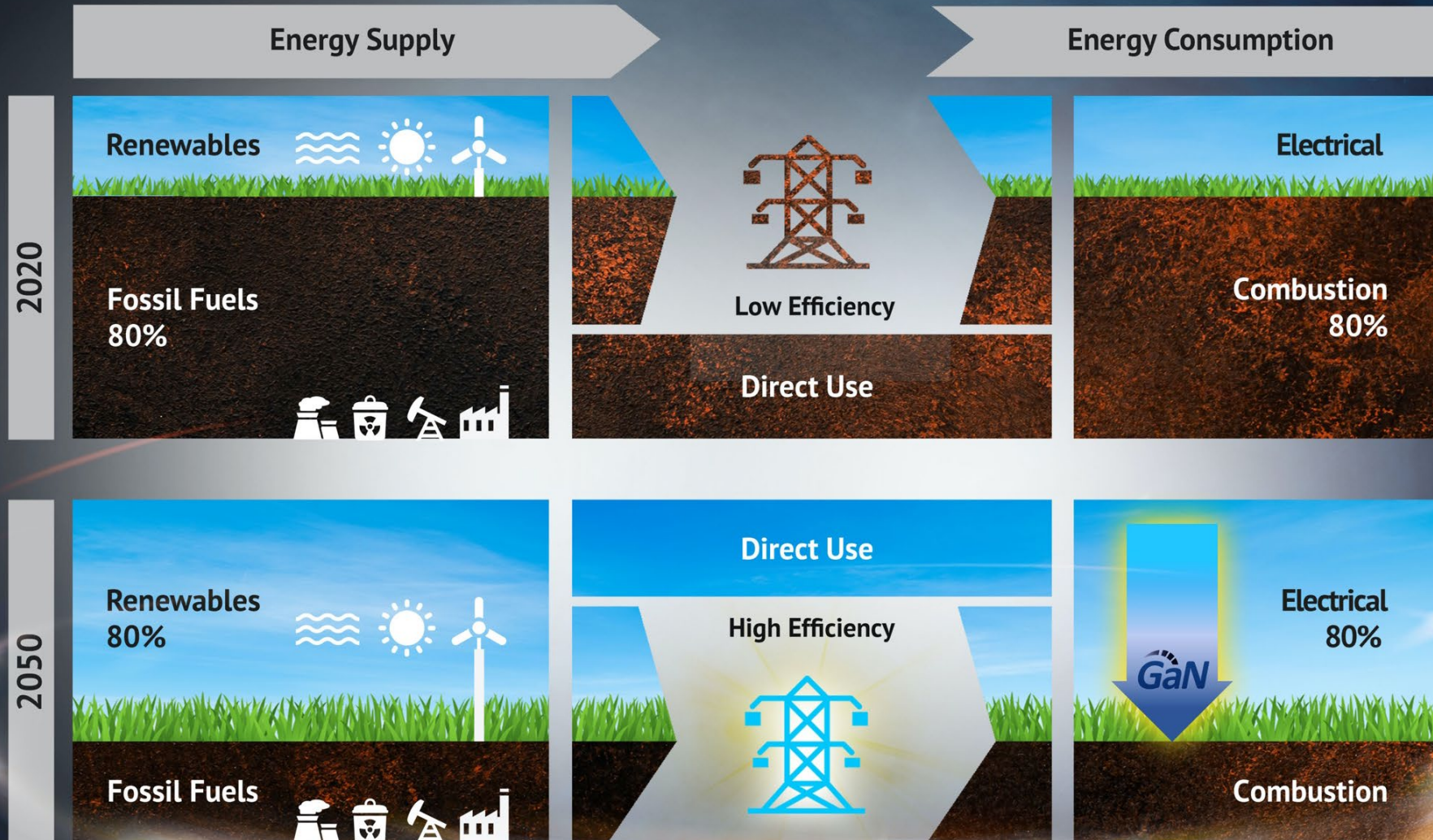
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# Electrify Our World™



# The Enabling Force



**20x**

Faster  
Switching

**3x**

Smaller &  
Lighter

Up To  
**40%**

Energy  
Savings

Up To  
**3x**

Higher  
Power Density

**3x**

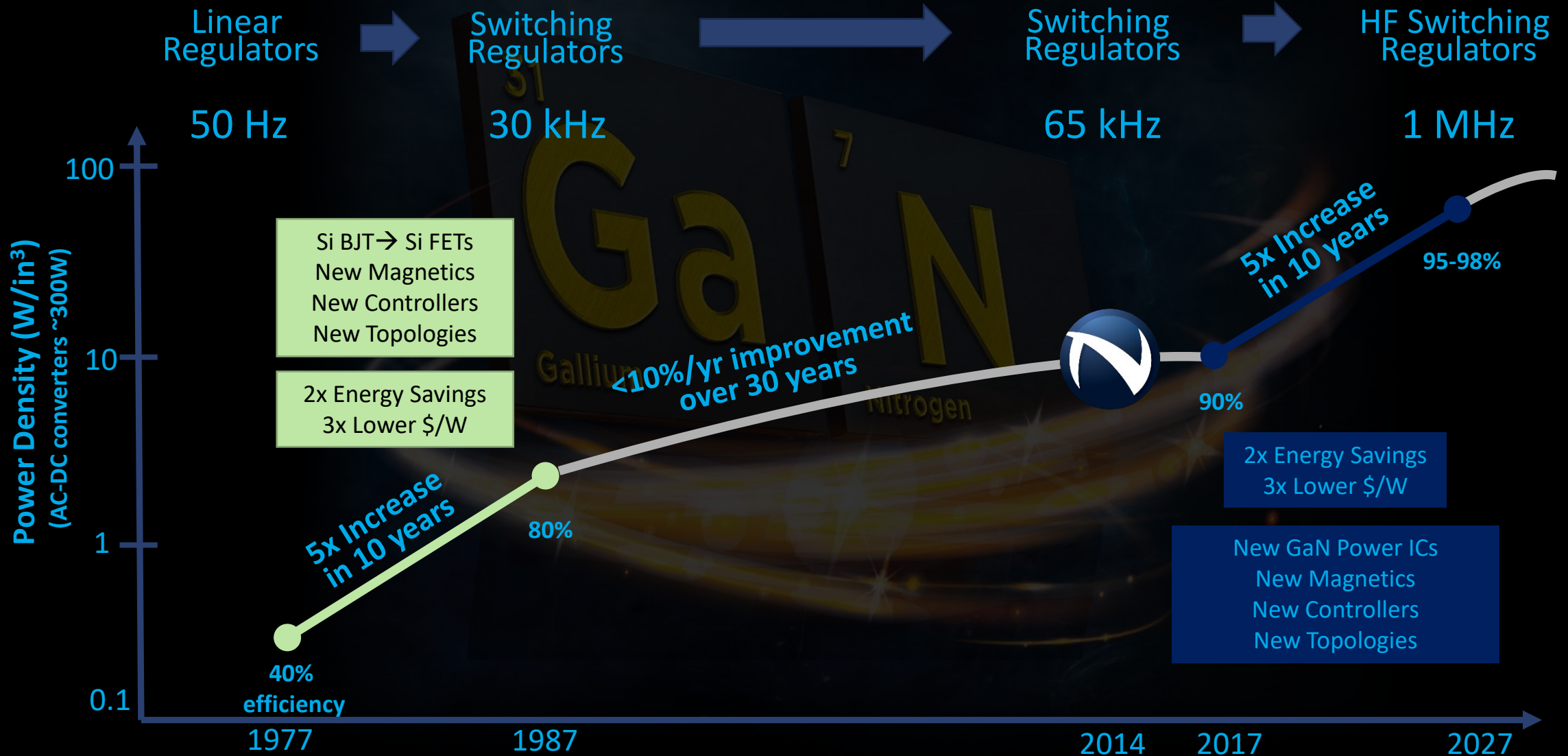
Faster  
Charging

**20%**

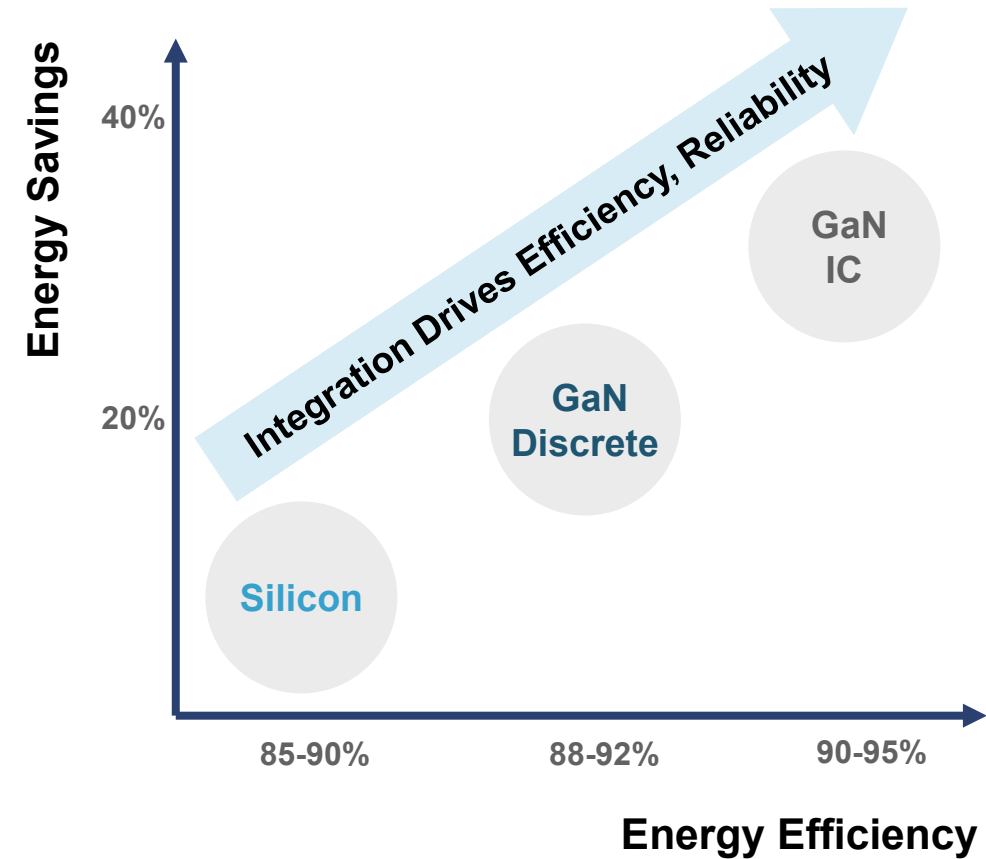
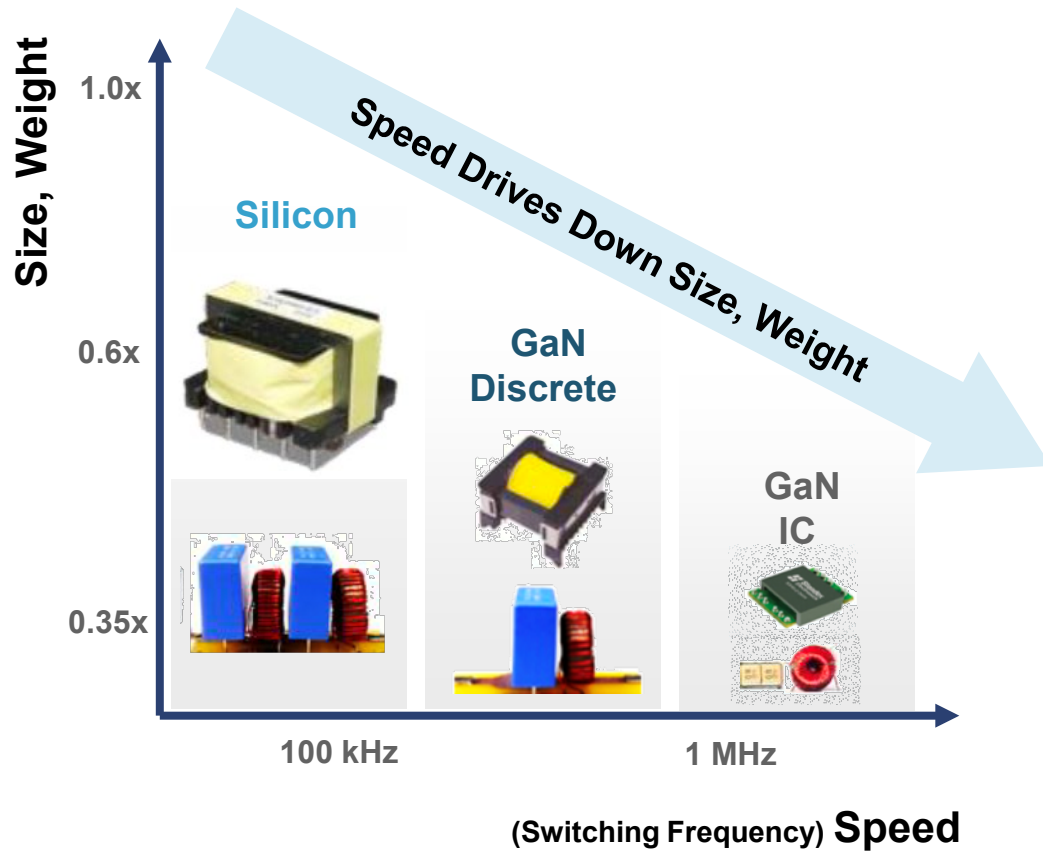
Lower  
System Cost

Once every 40 years...

# Second Revolution in Power



# Speed and Efficiency Drive Value



**GaN power ICs enable up to 3x smaller, lighter <sup>(1)</sup>**

**GaN ICs save 40% energy <sup>(2)</sup>, 100x more reliable <sup>(3)</sup>**

(1) Based on Navitas measurements of GaN-based chargers compared to Si-based chargers with the same output power.

(2) Navitas estimate of GaN-based power systems compared to Si-based systems in the 2024-2025 timeframe, Navitas measurements of select GaN-based chargers vs. Si-based chargers with similar power.

(3)  $V_{GS}$  failure distribution based on Navitas internal characterization of Discrete GaN Transistors compared to GaN power ICs.

# GaN-Driver Integration is Critical

	Driver Drive, control & protection	Parasitics Limit speed & efficiency	Power Device Si or GaN	Speed Switching Frequency	Power Density Faster Charging, Smaller Size
Silicon Discrete	<p>(in system controller)</p>	$L_G R_G$		< 100 kHz	<p>&lt;0.5 W/cc</p>
GaN Discrete, MCM	<p>(complex circuit)</p>	$L_G R_G$		< 200 kHz	<p>&lt;1 W/cc</p>
Navitas GaN IC				Up to 2 MHz (3-10x faster)	<p>&gt;&gt;1 W/cc</p>



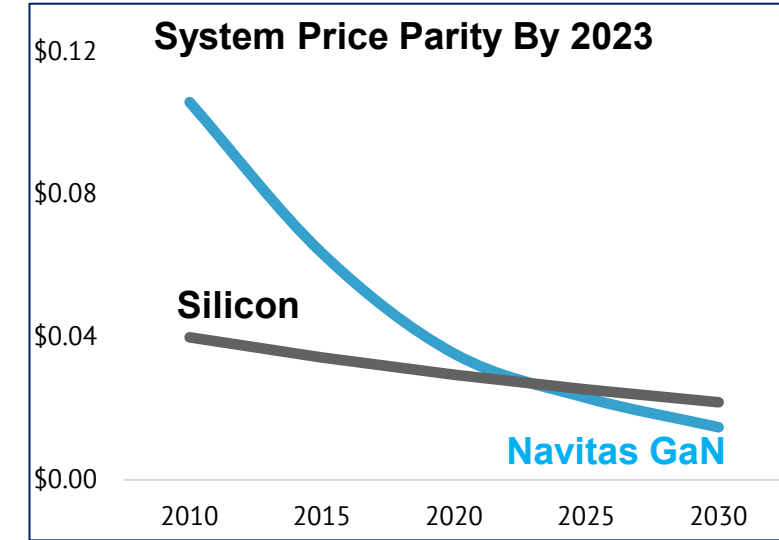
# Multi-Year Lead in IP, Innovation: Driving Down System Cost



- Industry inventor and pioneer for GaN power ICs
- Proprietary AllGaN™ Process Design Kit (PDK)
- 130+ patents awarded or pending



- New generation every 10-12 months
- Gen 3 GaNSense™ in production
- Gen 4 sampling Q4'21

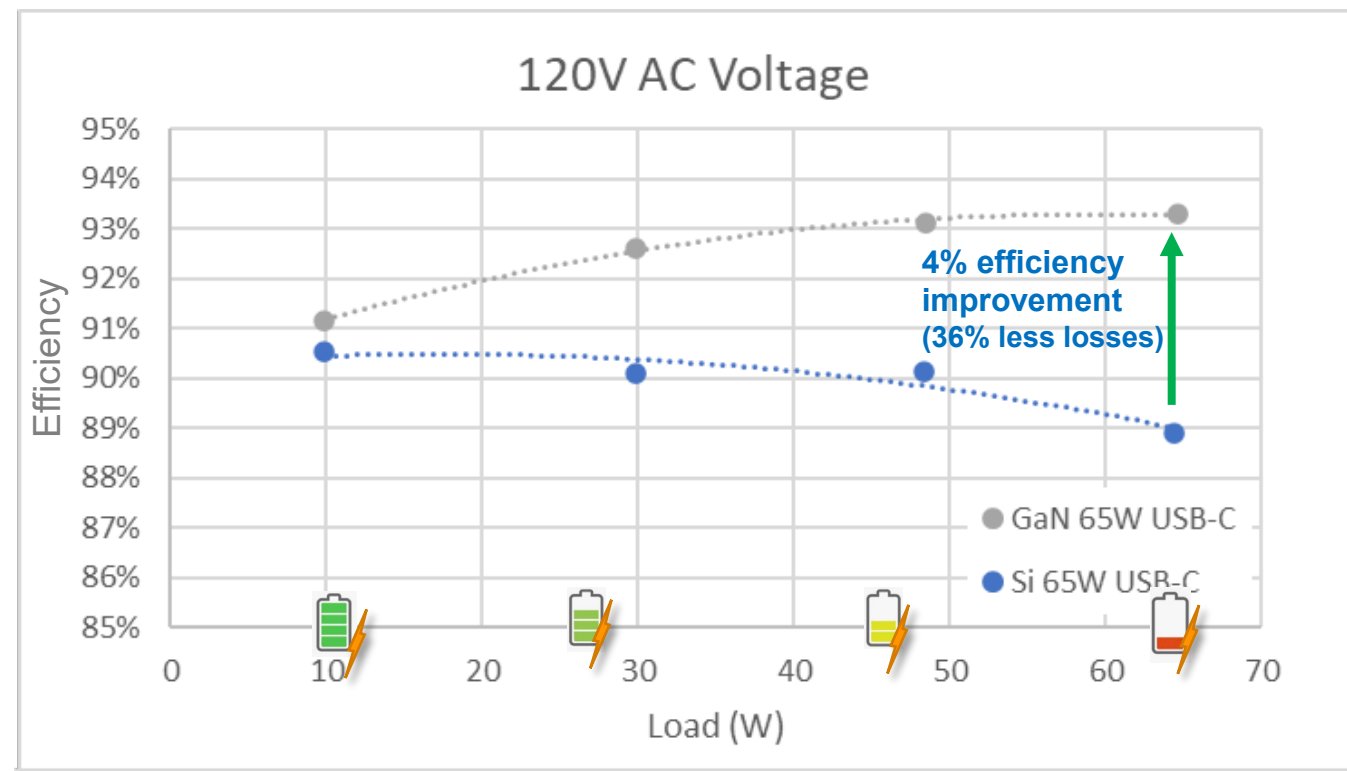


- System cost parity in 2023<sup>(1)</sup>
- 65W example

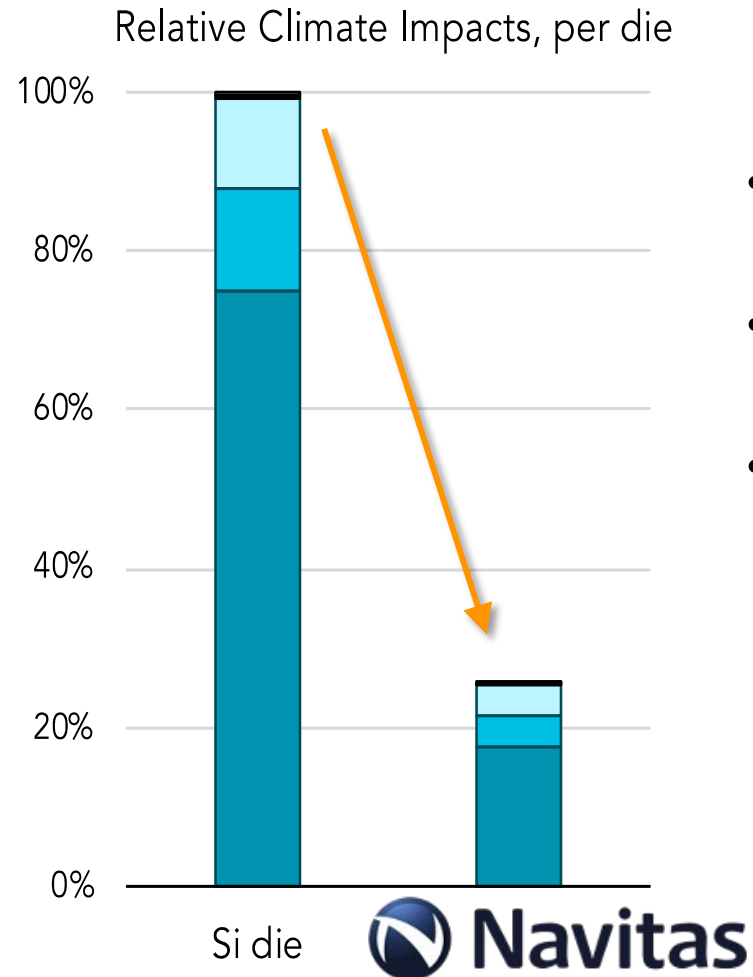
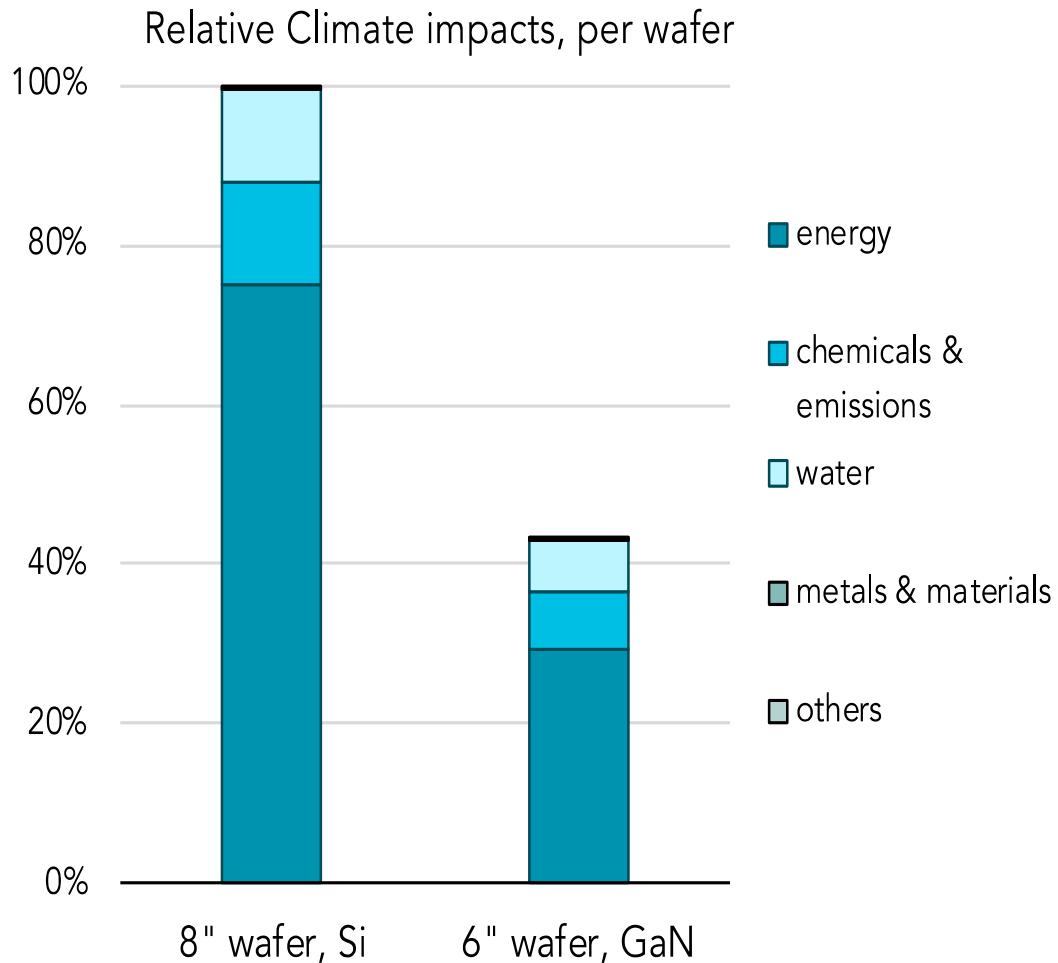


# Adapter Life Cycle Analysis, Si vs GaN

- Worst case power dissipation is at full load (65W) condition
  - Defines adapter size → Key factor in manufacturing impacts and dematerialization opportunities
- The Use-cases for this study show tradeoffs for Use-Phase Impacts
  - Total energy use across various use-cases: 70% heavy load / 30% light load
  - Full load efficiency is more important for use cases that include more charging and less plugged-in non-use
  - Light load efficiency becomes a larger factor for applications normally plugged in with light/moderate use → needs optimization across the power range
- Geography impacts Use-Phase impacts
  - Most adapters are targeted for global use so must be optimized for 115V and 240 V conditions

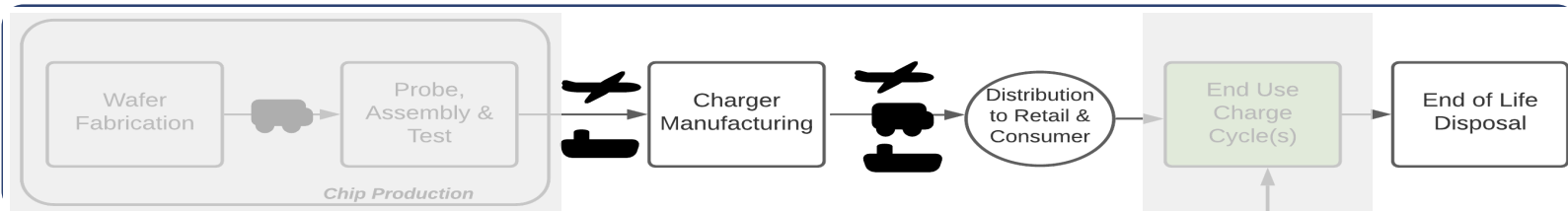


# 4x Lower CO<sub>2</sub> today

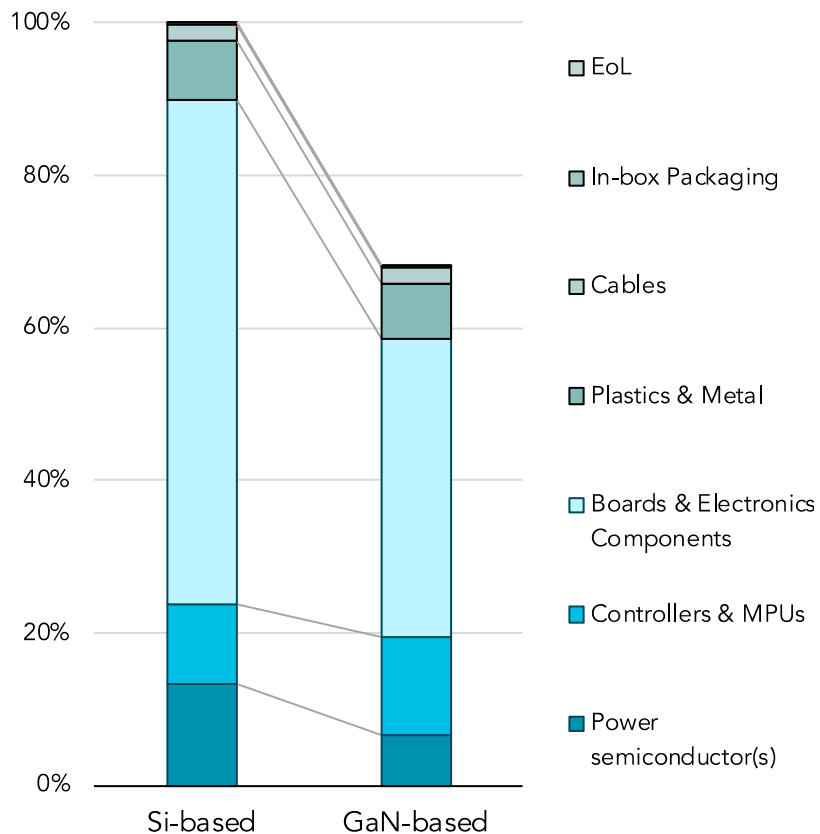


- Smaller GaN Die, More die per wafer
- 4x comparing Si on 8" vs GaN on 6" wafer
- Up to 10x when GaN moves to 8" wafer, including integrated components

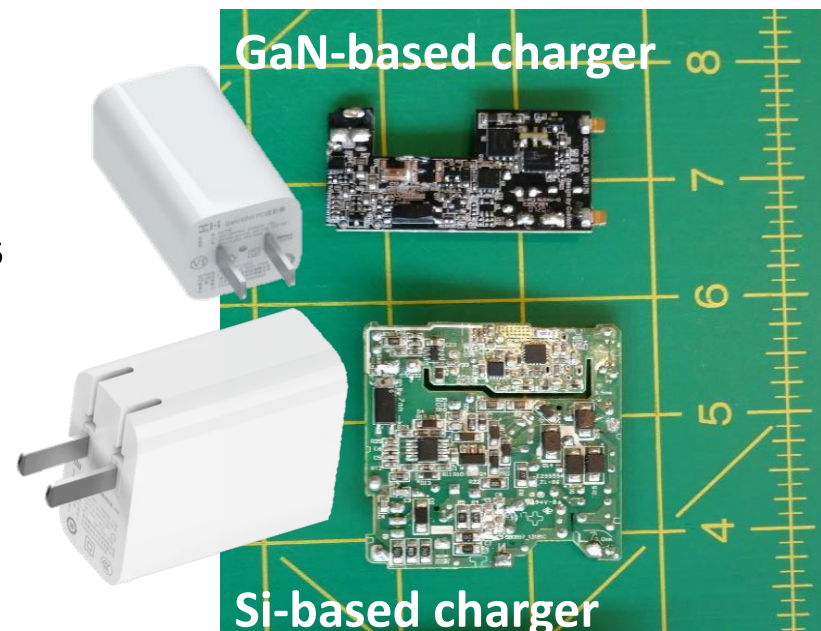
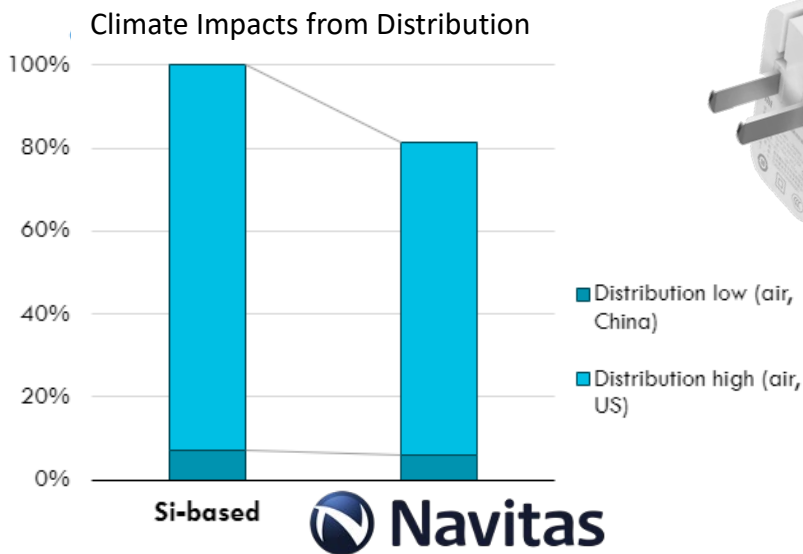
# Expected Dematerialization & Supply Chain Impacts



Relative Climate Impacts, 65W Charger

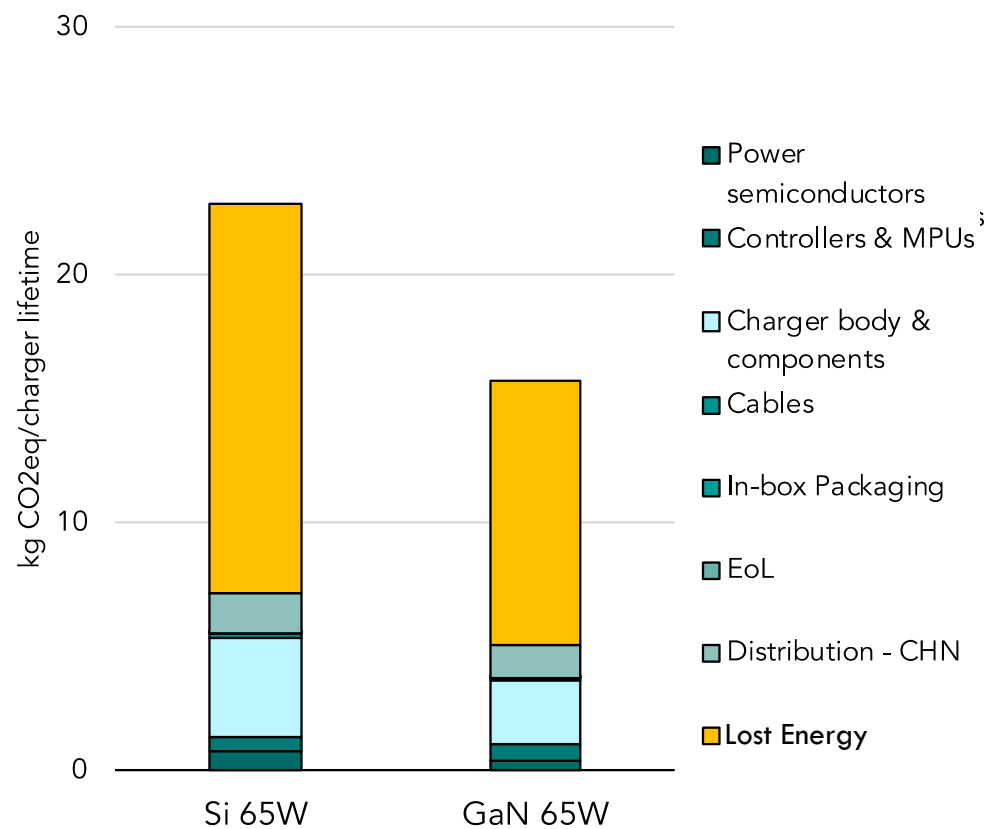


Using the GaN chip decreased charger components and weights

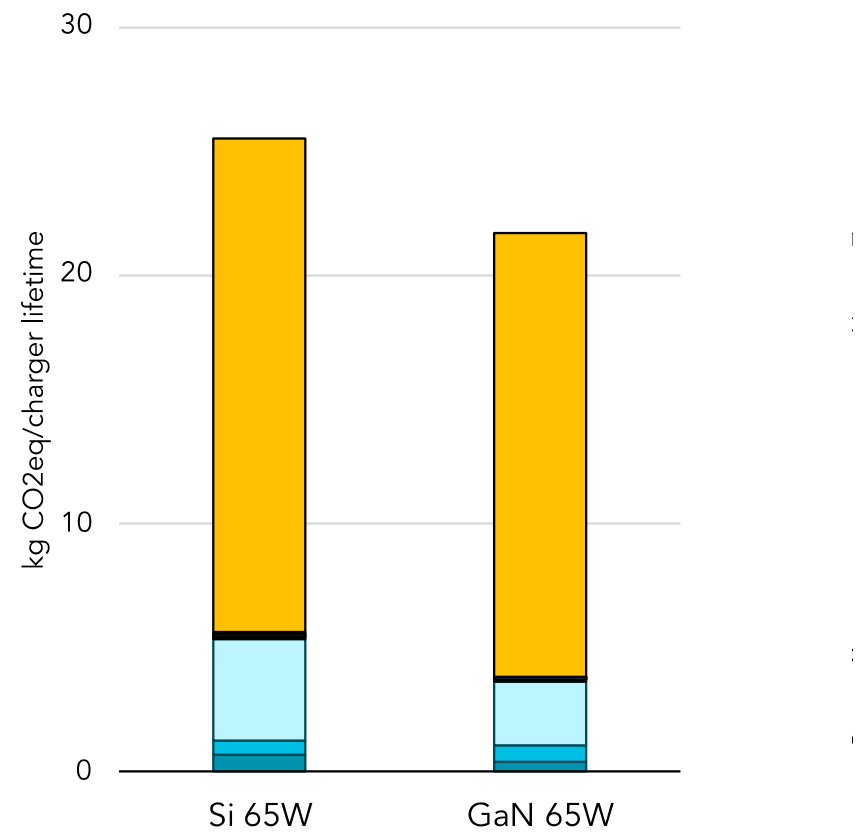


# Potential Use-Phase Impacts in different regions

Climate Impacts with Waste Energy - US (120V)



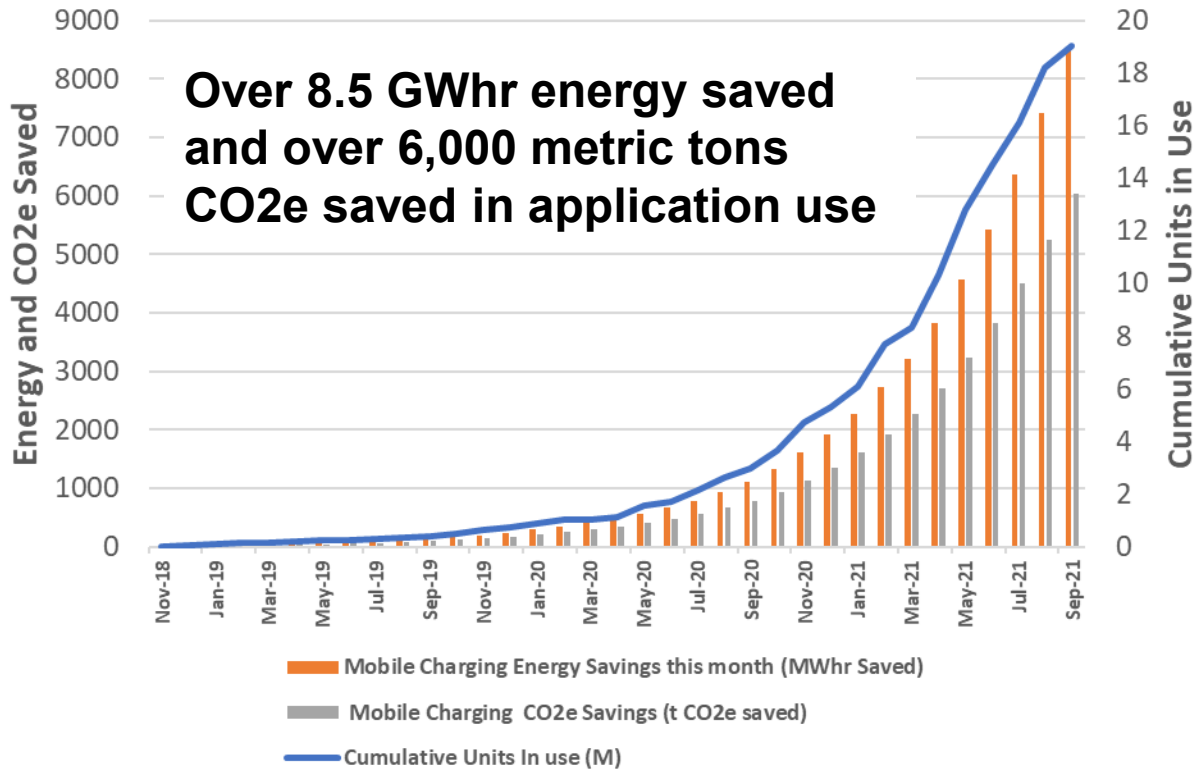
Climate Impacts with Waste Energy - China (230V)



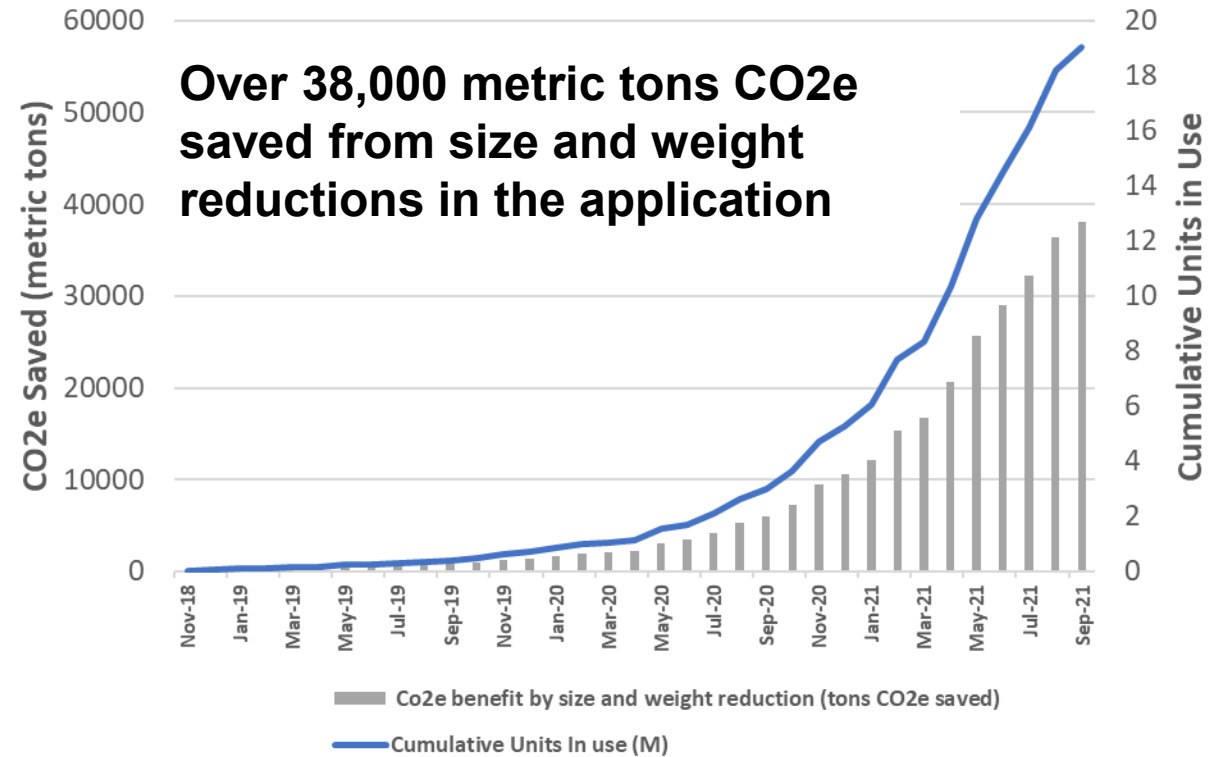
Work Travel Scenario (work untethered, plugged in only to charge)

# Sustainability Benefits of GaNFast ICs<sup>(1)</sup>

### Navitas Energy Savings Benefits



### Navitas Dematerialization Benefits

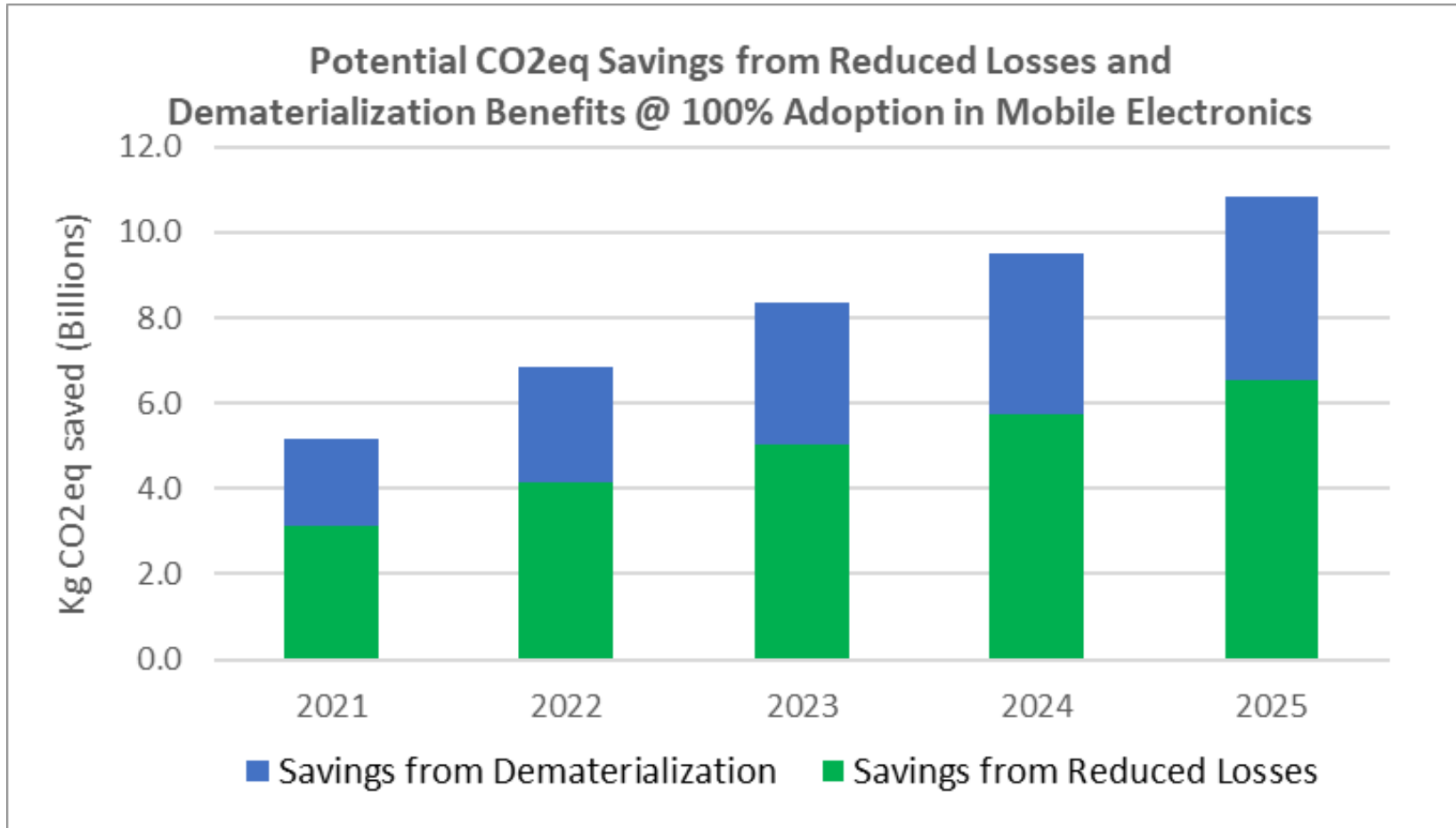


**Estimate over 44,000 metric tons CO2e saved from Navitas products used in the field to date**

**4,951,052**  
gallons of gasoline consumed

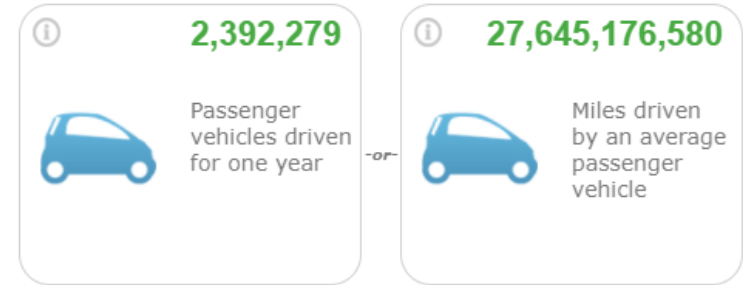
**101,869**  
barrels of oil consumed

# Potential Benefit from Adoption in Mobile Electronics

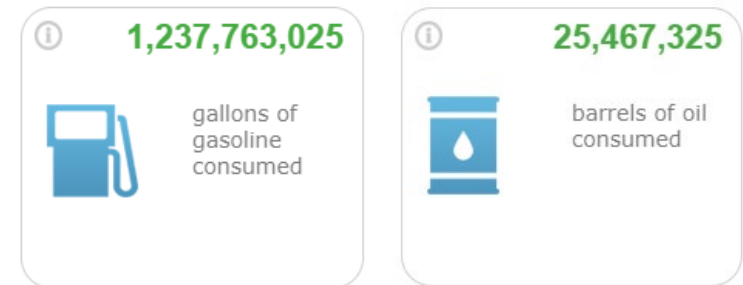


Based on forecast units by year for Phone/Tablet/Laptop/PC from industry research

### Greenhouse gas emissions from



### CO<sub>2</sub> emissions from



# Fast Chargers: 2-3% of \$2B - Growth Ahead!(2)

## Tier 1 OEMs



## Aftermarket Examples



**160+**  
GaN Chargers In Mass Production

**150+**  
GaN Chargers In Development (MP 2021-2022)

**90%+**  
Mobile OEMs Designing With Navitas GaN ICs

**30M+**  
GaN ICs Shipped(1)

**Zero**  
GaN Field-Failures(1)

Note: #Charger metrics as of October 2021. Shipments as of October 31st 2021

(1) Based on no customer-reported consumer failures for production shipments through October 10th, 2021.

(2) Navitas estimated based on total GaN sales worldwide, estimated charger / adapter sales from Yole data



# Beyond Chargers: Dynamic Expansion Markets



## Efficiency, Size, Weight Drive Adoption

### • Consumer

- Up to 3x smaller, lighter, low-profile
- TV: UHD to 8K needs 4x power
- **>\$2B/yr potential<sup>(1)</sup>**
- Lead opportunities in late-stage development<sup>(2)</sup>
- Awarded Tier-1 All-in-one PC



### • Solar

- 25% *cost reduction* of micro-inverters<sup>(3)</sup>
- Up to 40% energy savings
- *Improve payback by 10%+* <sup>(4)</sup>
- **Residential potential >\$1B/yr<sup>(5)</sup>**



“It's the *end of the road for silicon.*”

“GaN offers >10x frequency, *significant* cost advantages”



### • Data Center: Save \$1.9B/yr <sup>(11)</sup>

- 44% of cost is electricity<sup>(11)</sup>, GaN could reduce by up to 10%<sup>(12)</sup>
- Save >15 TWh or \$1.9B/yr, 2-month ROI<sup>(13)</sup>
- **\$1B+ /yr potential<sup>(14)</sup>**



“GaN is a *breakthrough new technology*”

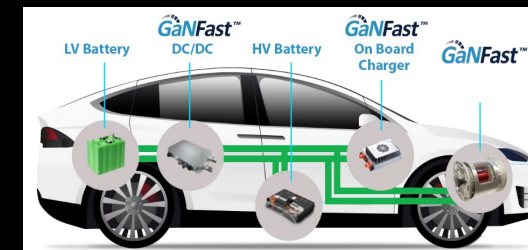
“Navitas: *excellent partner, industry-leading GaN ICs*”



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### • EV: Accelerate Adoption by 3 years <sup>(6)</sup>

- 3x faster charging<sup>(7)</sup>
- 70% energy savings enables
- 5% longer range, or 5% lower battery cost<sup>(8)</sup>
- **>\$2.5B/yr potential in 2030<sup>(9)</sup>**



- OBC ~\$ 50
- DC-DC ~\$ 15
- Traction ~\$200
- GaN potential/EV = ~\$250 <sup>(10)</sup>

“Navitas advantages: *simplicity of driving, high-speed, reliability & compact form factor.*”



# GaNFast is Green:

Accelerating Major Customers' Net Zero and Carbon Neutral Goals

## GaN Power ICs Reduce CO<sub>2</sub> Emissions

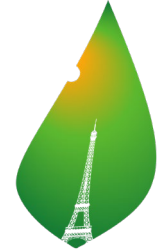
**4x-10x** lower component CO<sub>2</sub> footprint than silicon<sup>(1)</sup>

**28% lower** lifetime CO<sub>2</sub> footprint for chargers / adapters<sup>(2)</sup>

**Accelerate** transition from ICE to EV by **3 years**, saving **20%/yr** of road sector emissions by 2050 <sup>(4)</sup>

GaN addresses **2.6 Gton / year** by 2050<sup>(5)</sup>

Every  
**GaNFast™** power IC  
shipped saves<sup>(3)</sup>  
**4 kg CO<sub>2</sub>**



PARIS2015  
UN CLIMATE CHANGE CONFERENCE  
COP21·CMP11



(1) Navitas and Earth-Shift Global analysis. 4x lower for 2021, 10x lower by 2022 per life-cycle analysis

(2) Navitas and Earth-Shift Global estimated based on 65W charger per life-cycle analysis

(3) Navitas estimate based on GaN vs Si total life-cycle analysis.

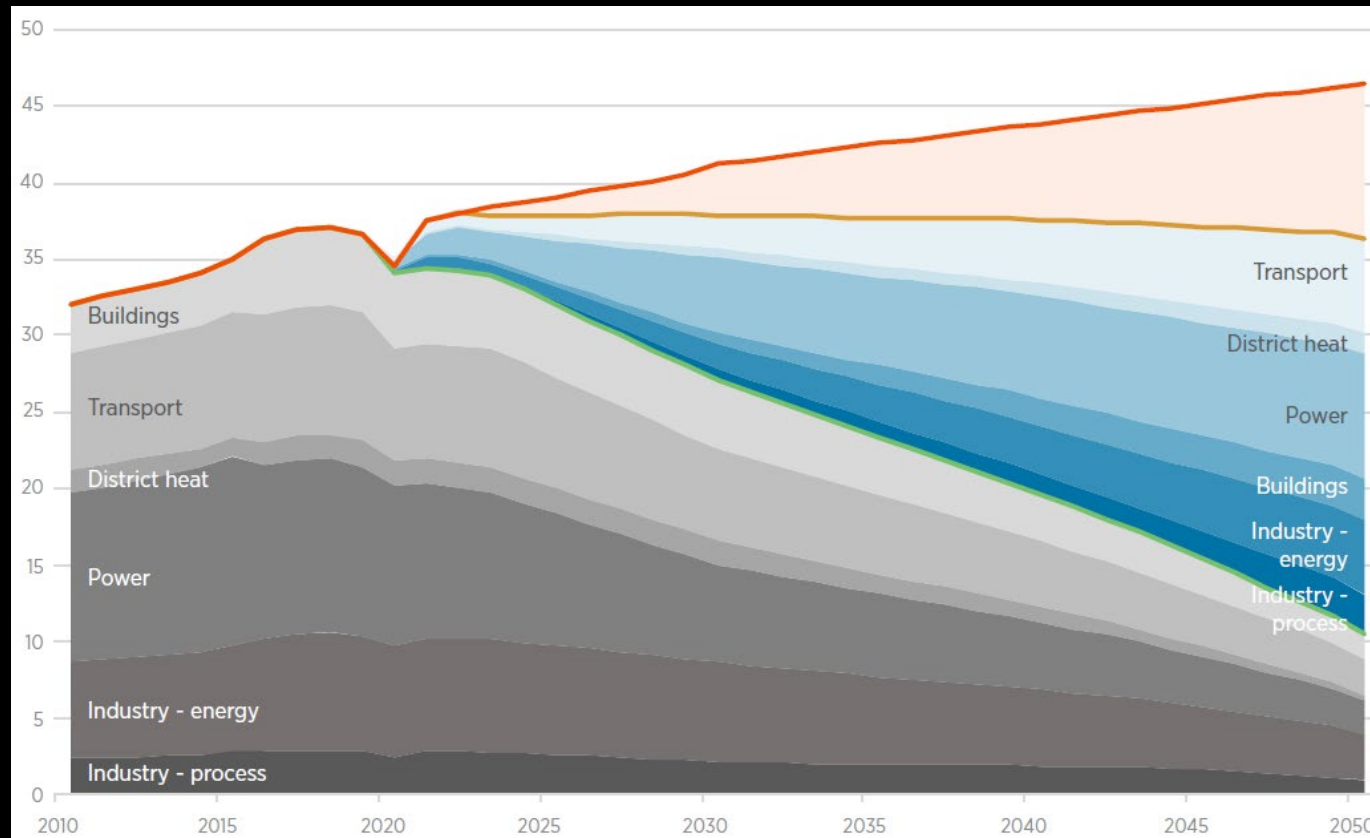
(4) DNV estimate for 75%-adoption milestone pull-in, total road sector benefit

(5) Company information, DNV GL, EPA, IEA, International Renewable Energy Agency (IRENA). See 5-7-21 Investor presentation for details (filed with SEC)

Derived from demand and energy efficiency CO<sub>2</sub> reduction of 1.4 Gt; assumes a \$0.12 / kWh cost of electricity and a carbon to energy ratio of 0.00071 tons / kWh, aligned with the EPA's marginal emission rate.

# GaN Addresses the Paris Accord and COP26

Energy and process-related  
CO<sub>2</sub> emissions (Gton/year)



By the 2050 timeline of the Paris Accord, Navitas targets that GaN would address a  
2.6 Gton/year reduction in CO<sub>2</sub> emissions

= Over 6 billion barrels of oil, or over 600 coal power plants

16 Gton CO<sub>2</sub> Reduction Target

Wide Band Gap

GaN

# Join the GaN Generation!



[www.navitassemi.com](http://www.navitassemi.com)  
[www.ganfast.com](http://www.ganfast.com)



Let's go GaNFast™

# References to Slide 16 (Expansion Markets)



1. Based on Navitas measurements comparing typical 150W 65 kHz Si-based AC/DC power adapter to 150W 1MHz GaN-based power adapter prototype.
2. Based on information provided to management by potential customers.
3. EnergySage Solar Marketplace, 2020.
4. Based on estimates from Gartner, Pulsenews, WitsView, Statista and Navitas estimates
5. Navitas est. vs. Si-based 500W residential micro-inverters assuming GaN-based inverter enables 40% reduced power loss and 25% lower inverter costs
6. Navitas est. average 2021-2030, residential installations, MarketsandMarkets, IHS, Fraunhofer ISE, customer input.
7. Navitas engineering estimate 6.6 kW Si OBC vs. 21 kW GaN OBC assuming a 90 kWh battery and 80A wall charge limit.
8. Assumes 150 kW traction inverter, 100 kWh battery, \$100/kWh battery cost and typical 230 mile range. Based on DNV and Navitas analysis
9. Based on BCG Research, Yole Research and Navitas analysis.
10. Navitas estimate based on discussions with major suppliers of power electronics to the electric vehicle industry.
11. Navitas estimate based on a) Navitas server/datacom forecast & AAAS data, b) \$0.12/kWhr, c) Si vs. GaN \$/W and d) data center loading profile.
12. Navitas estimated based on known existing Si-based solutions to deliver >500A next-generation data processors to Navitas targets for new GaN-based AC/DC and DC/DC for these same next-generation data processors.
13. Schneider Electric. White Paper – Determining Total Cost of Ownership for Data Center and Network Room Infrastructure.
14. Navitas measurements based on existing Si-based 3.2kW AC/DC server power supply to a 1 MHz GaN-based 3.2kW AC/DC prototype.