Electrification

IFX Day 2021

virtual format, 5 October 2021

Electrification and Digitalization

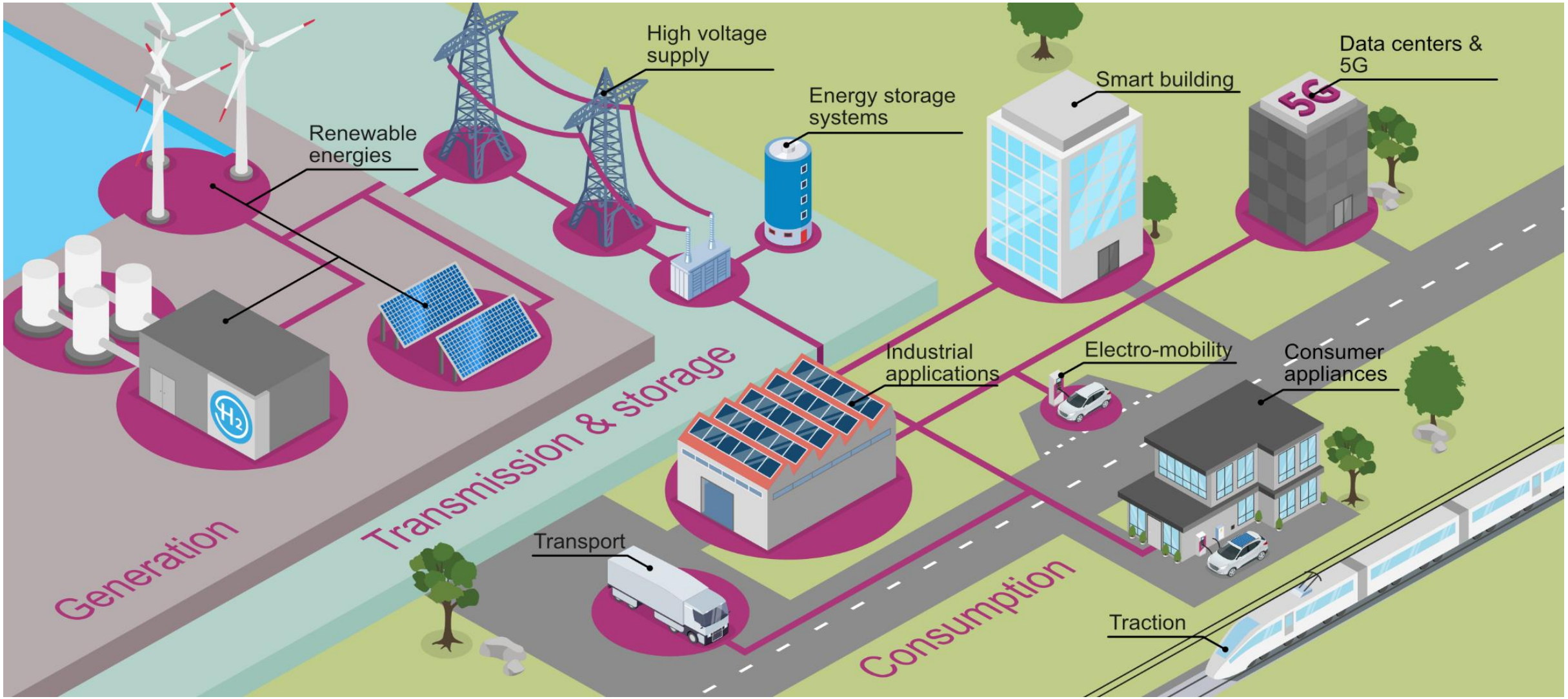
Electrification

- CO_2 saving
- Energy efficiency
- Cost saving

Digitalization

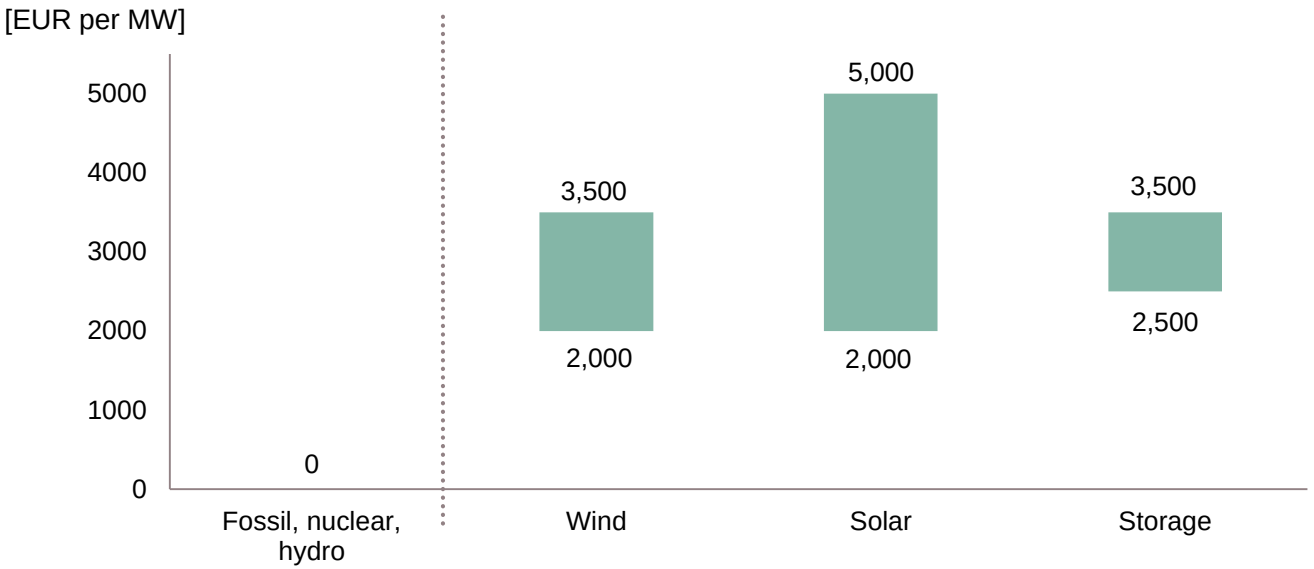
- Productivity
- Comfort
- New use cases

The energy conversion chain



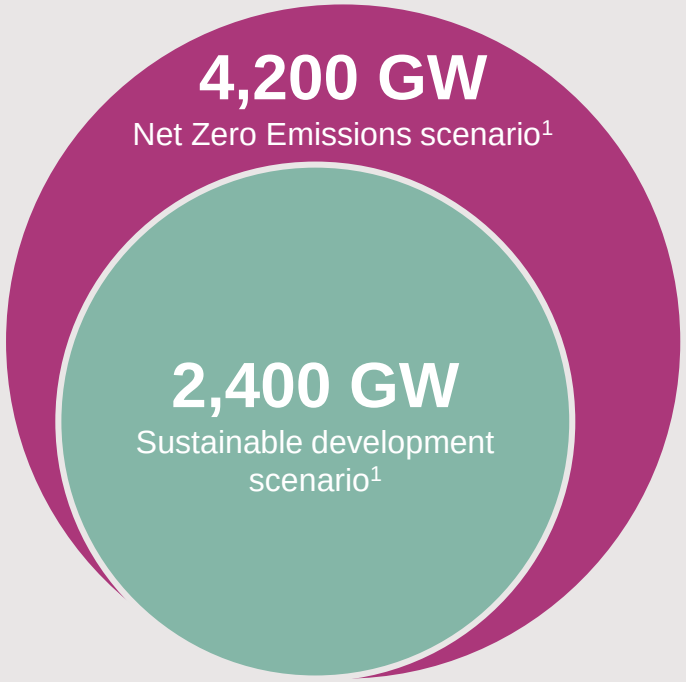
Green energy generation provides large business opportunities

Power semiconductor content by application



[GW]	Fossil, nuclear, hydro	Wind	Solar	Storage
Additions in 2020	114	134	5[2]	
Ø 2021 – 2030 annual additions Sustainable development scenario[1]	110	240	22[2]	
Ø 2021 – 2030 annual additions Net Zero Emissions (NZE) scenario[1]	240	420	33[3]	

Upside potential: example solar power

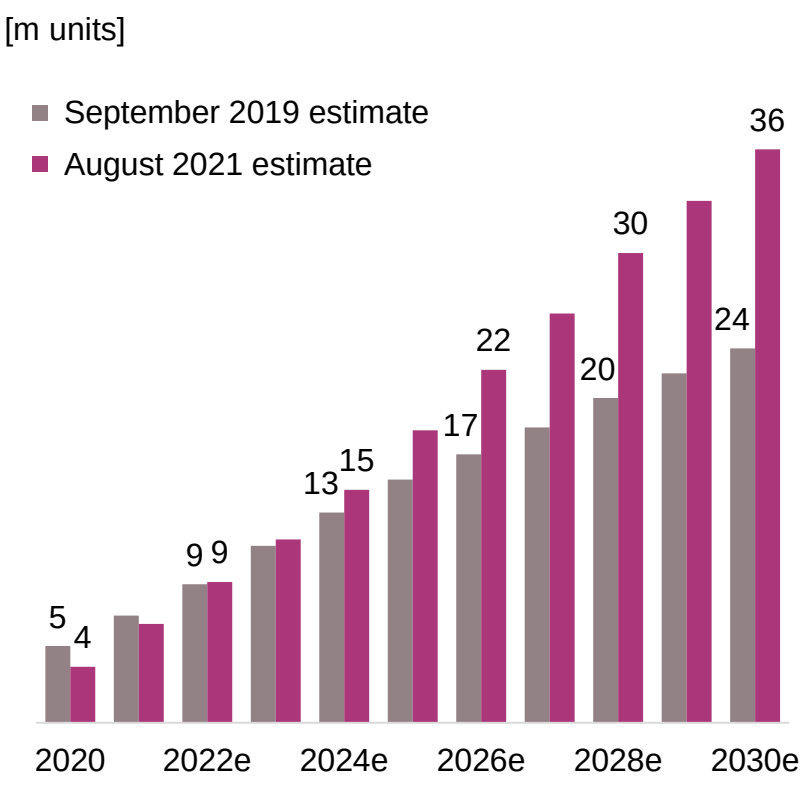


Global cumulated additions in solar power capacity until 2030.

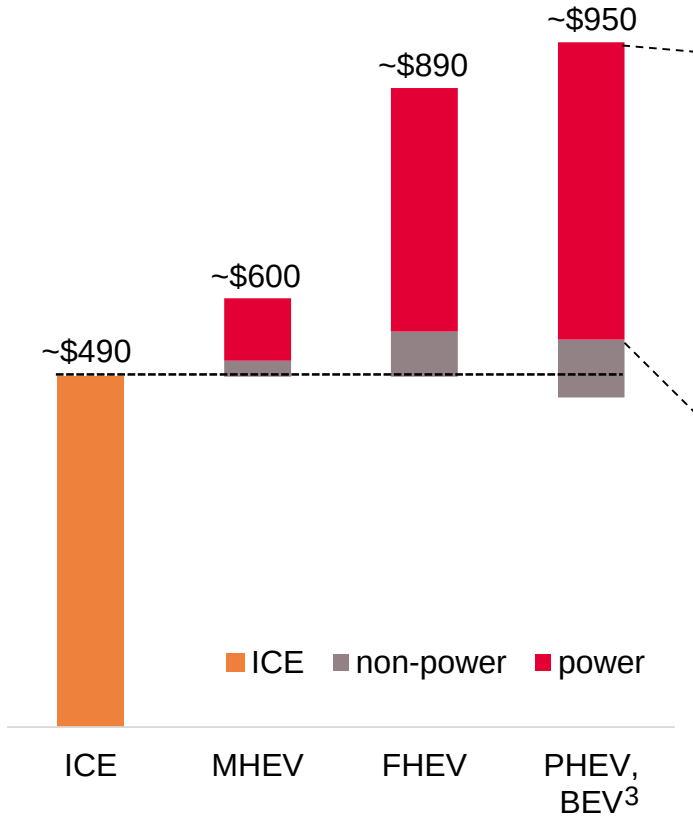
1 IEA: *Net Zero by 2050 - A Roadmap for the Global Energy Sector*. May 2021 | **2** Based on or includes content supplied by IHS Markit Climate and Sustainability Group: *Grid Connected Energy Storage Market Tracker H1 2021*. August 2021
3 Extrapolation; conservative assumption of equal ratio renewable generation to storage capacity

The penetration of PHEV + BEV is accelerating; the incremental content of power semis in xEV is a significant opportunity for Infineon

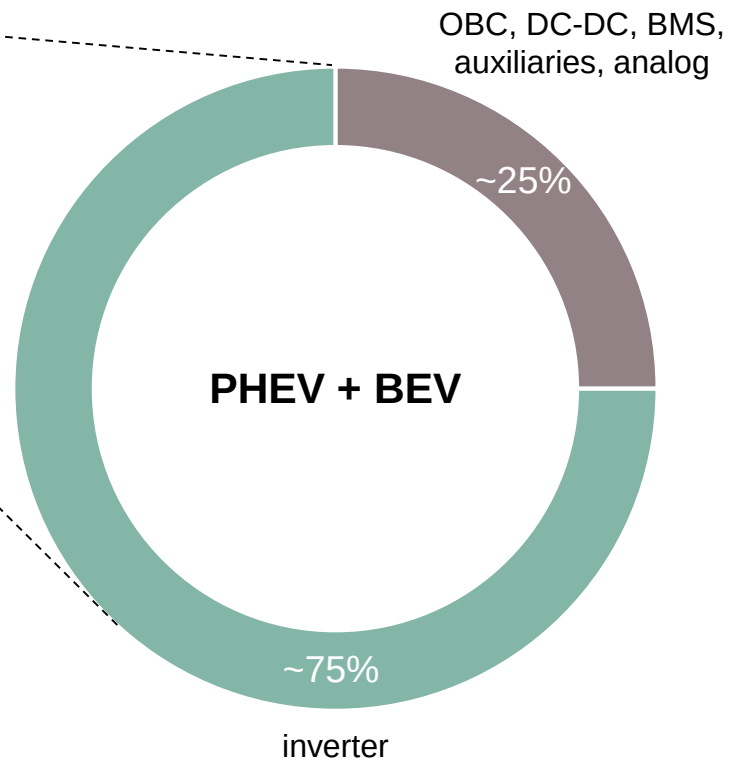
PHEV + BEV annual car production[1]



2021 average xEV semi content[2]



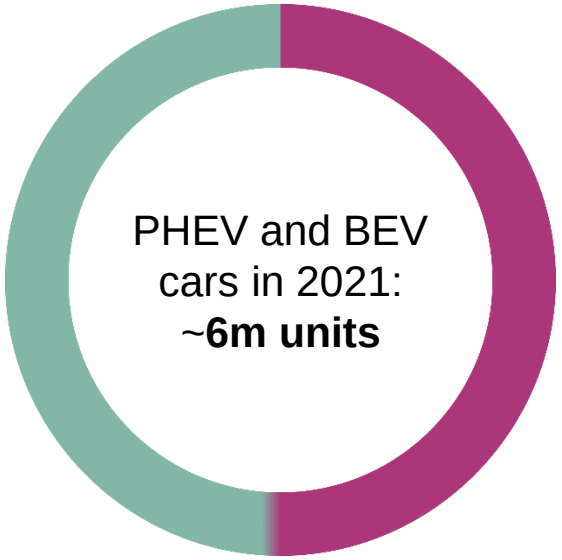
Incremental power semi by application



1 Based on or includes content supplied by IHS Markit Automotive: *Alternative Propulsion Forecast.* September 2019, August 2021.
2 Strategy Analytics: *Automotive Semiconductor Demand Forecast 2019 - 2028*. July 2021; Infineon. "power" includes voltage regulators, ADCs and ASICs.
3 Due to missing ICE engine in BEV the weighted incremental semiconductor content for PHEV and BEV starts below the "~$490" line.

For newly produced cars in CY21, about every second inverter for a PHEV or BEV car is equipped with Infineon power semiconductors

2021e PHEV + BEV inverters[1]



Share of inverters equipped with Infineon chips or modules

Ex. of OEMs powered by Infineon

Examples of SiC design-wins

- Infineon has an excellent position to win upcoming SiC-based xEV platforms:
  - leverage huge IGBT customer base with broadest portfolio and full system solution
  - seamless and cost-effective upgrade path across entire power range

1 Based on or includes content supplied by IHS Markit Automotive: *Alternative Propulsion Forecast.* August 2021; Strategy Analytics: *Automotive Semiconductor Demand Forecast 2019 - 2028*. July 2021; Infineon

SiC – Infineon is leading the market for industrial applications

Focus applications

Tipping points reached

Growing number of industrial applications use SiC:

- reduction of system cost
- reduction of system size
- higher efficiency and reduced total cost of ownership

Infineon serves

> 3,000

industrial customers directly or via distribution

Customers

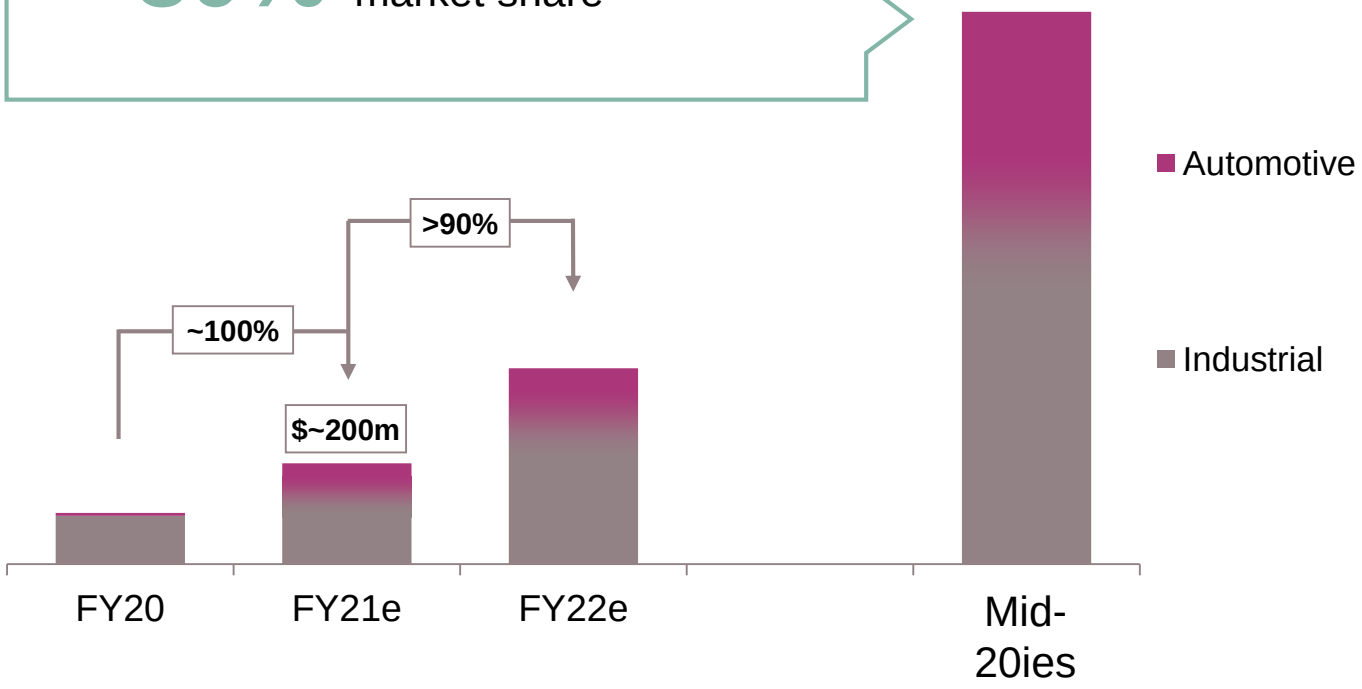
alpitronic
中国中车 CRRC
DELTA
LG
LITEON
Schneider Electric
SIEMENS
SMA
solaredge
阳光电源 SUNGROW
TRITIUM

SiC – US$ 1 billion revenue in sight

SiC revenue development

~$1bn revenue

~30% market share

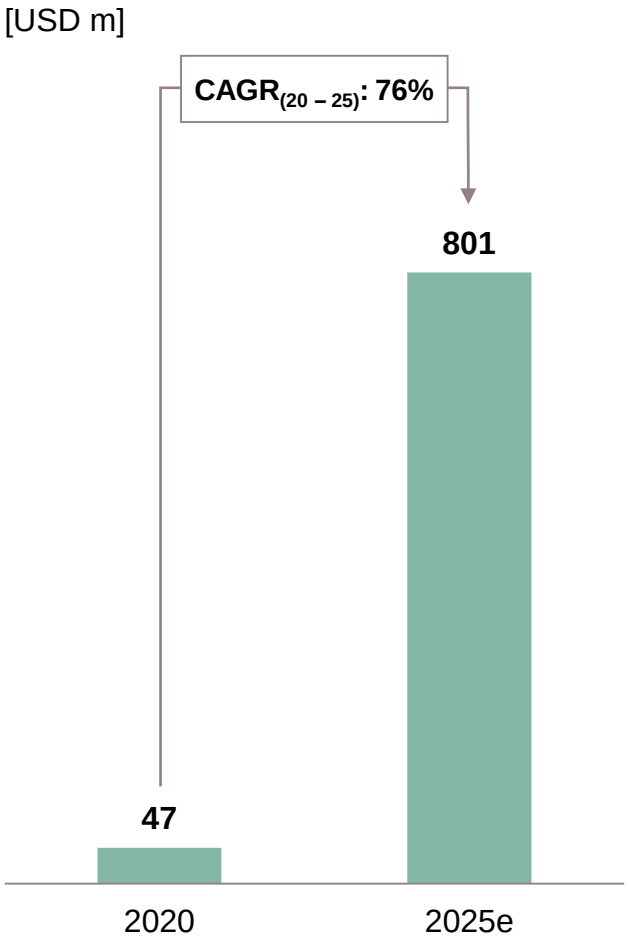


Infineon's success factors

- Best in class Trench MOSFET on the market
- 2nd Gen. CoolSiC™ Trench MOSFET will be launched in FY22
- Broadest portfolio fits customers' individual needs
- Scalable portfolio allows for easy and seamless upgrade from IGBT to SiC-based inverters
- Strong module capabilities
- System expertise and customer access

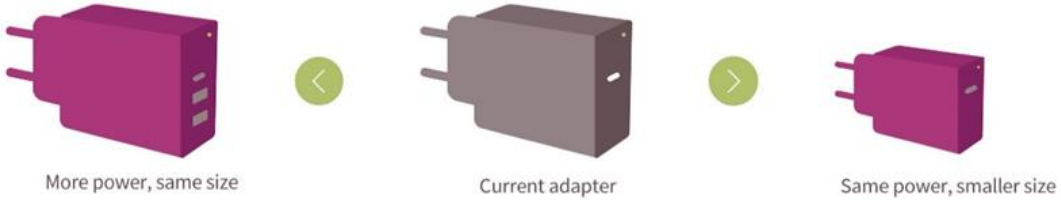
GaN technology – Infineon well positioned to address key markets

GaN market forecast[1]



Key values of GaN vs Si

Higher power density in adapters and chargers



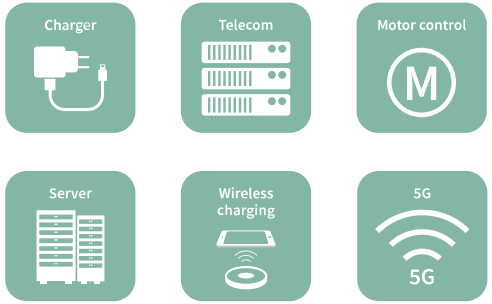
10x switching frequency	**> 2%** more power efficiency	**20%** lower System Cost	**25%** higher power density	**3x** less weight

We combine leading-edge system and application understanding with additional strengths:

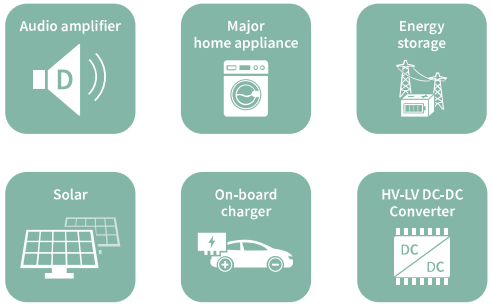
Broad GaN IP portfolio, large R&D force and best-in-class manufacturing landscape

Applications

Focus applications



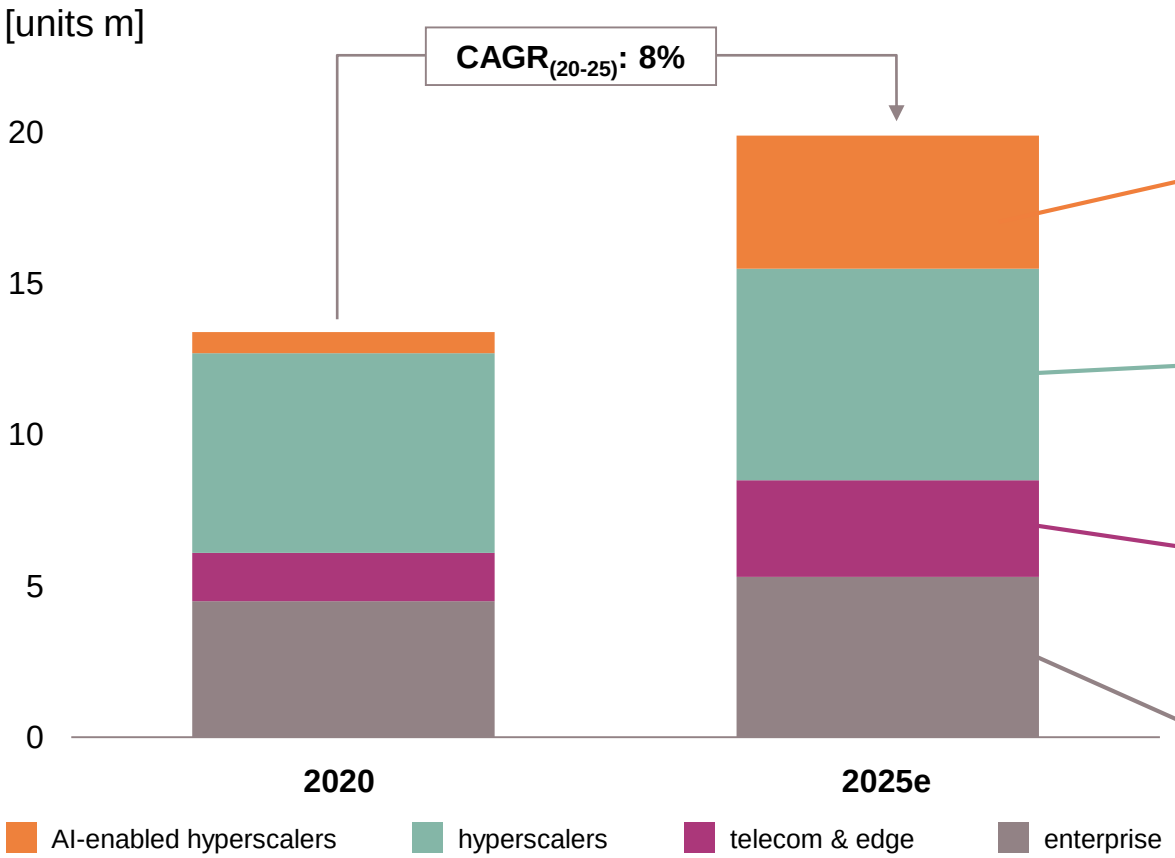
Emerging applications



1 GaN power devices market forecast. Yole Développement (Yole): *Compound Semiconductor Quarterly Market Monitor: From technologies to markets; Quarterly Update Module 1*. Q3 2021

Data center – AI hyperscaler and telecom/edge computing are driving the growth

Server growth



Power requirement per server

Power[1]:

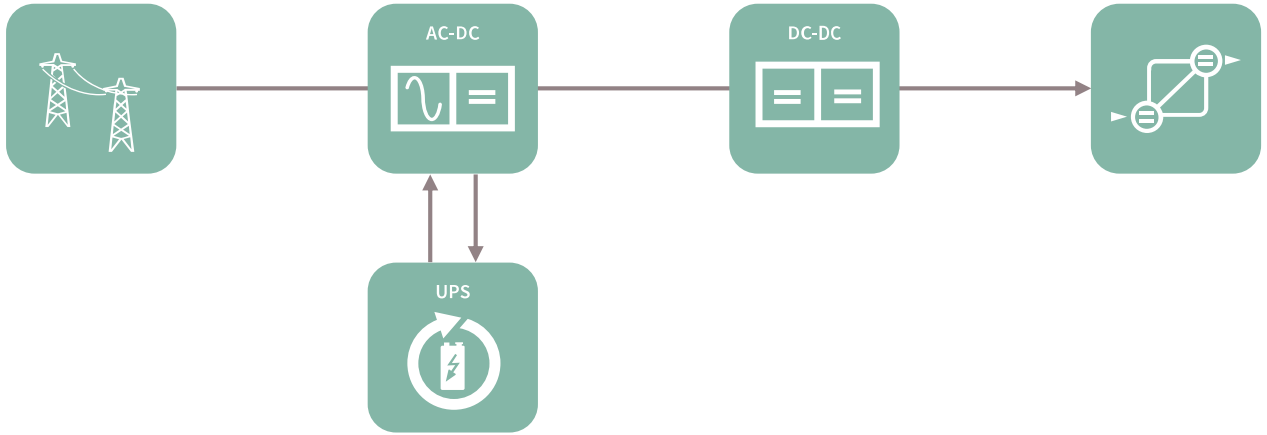
Exponential increase in **AI Training & Networking** (ASIC/SoC/FPGA/CPU/GPU) power level requires cutting-edge innovation in Device & Packaging technologies to solve power efficiency and density challenges

→ The bill of material is outpacing unit growth by a factor of ~1.3x.

1 Normalized overall power requirement per server board for x-comparison
Based on or includes research from Omdia: *Data Center Server Equipment Market Tracker – 2Q21 Database. September* 2021

Infineon offers complete solutions for all types of data centers at constantly increasing efficiency

From the grid to the point of load



Selected customers and partners

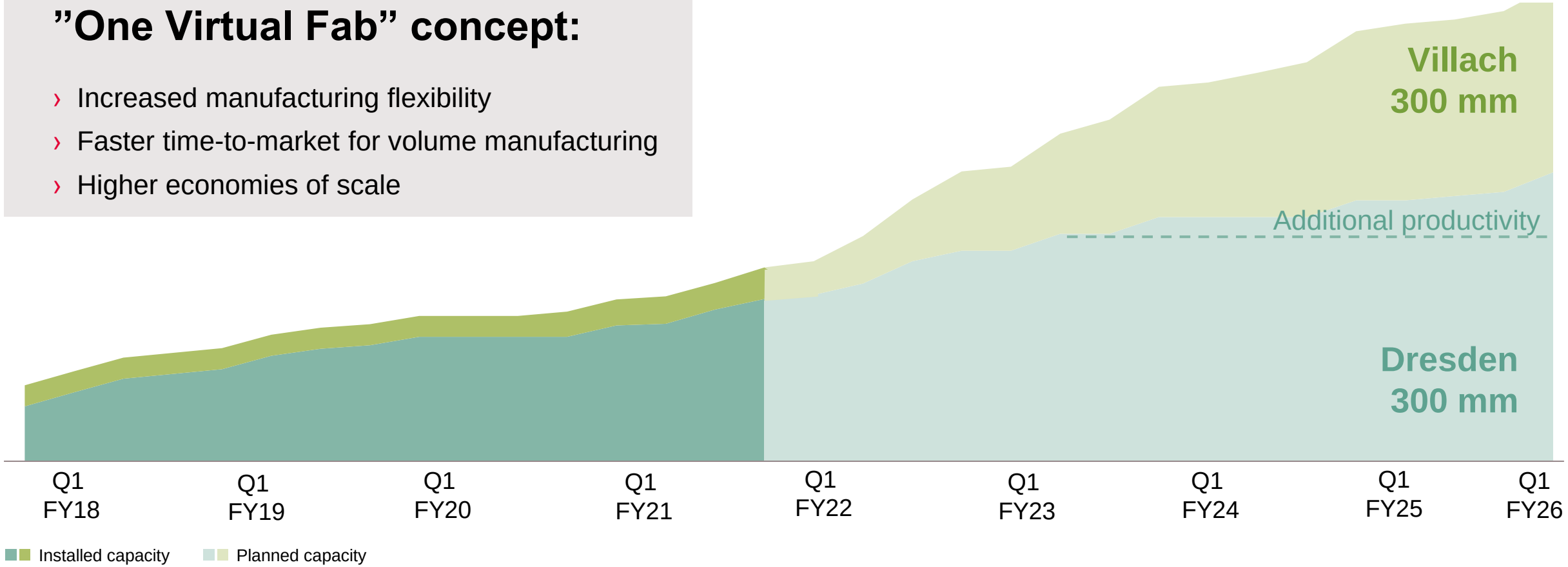
- Complete solutions for **all types of data centers** based on full portfolio of switches, drivers and controllers
- Significant increase in **CPU power levels (30% to 40%)** driving the need for superior efficiency and power density
- Exponential increase in **AI training and networking** (ASIC/SoC/FPGA/CPU/GPU) power level requires cutting-edge innovation in device and packaging technologies to solve power density challenges

We can follow the market demand by accelerating the 300 mm ramp in Dresden & Villach, One Virtual fab takes us to the next level

We benefit from our

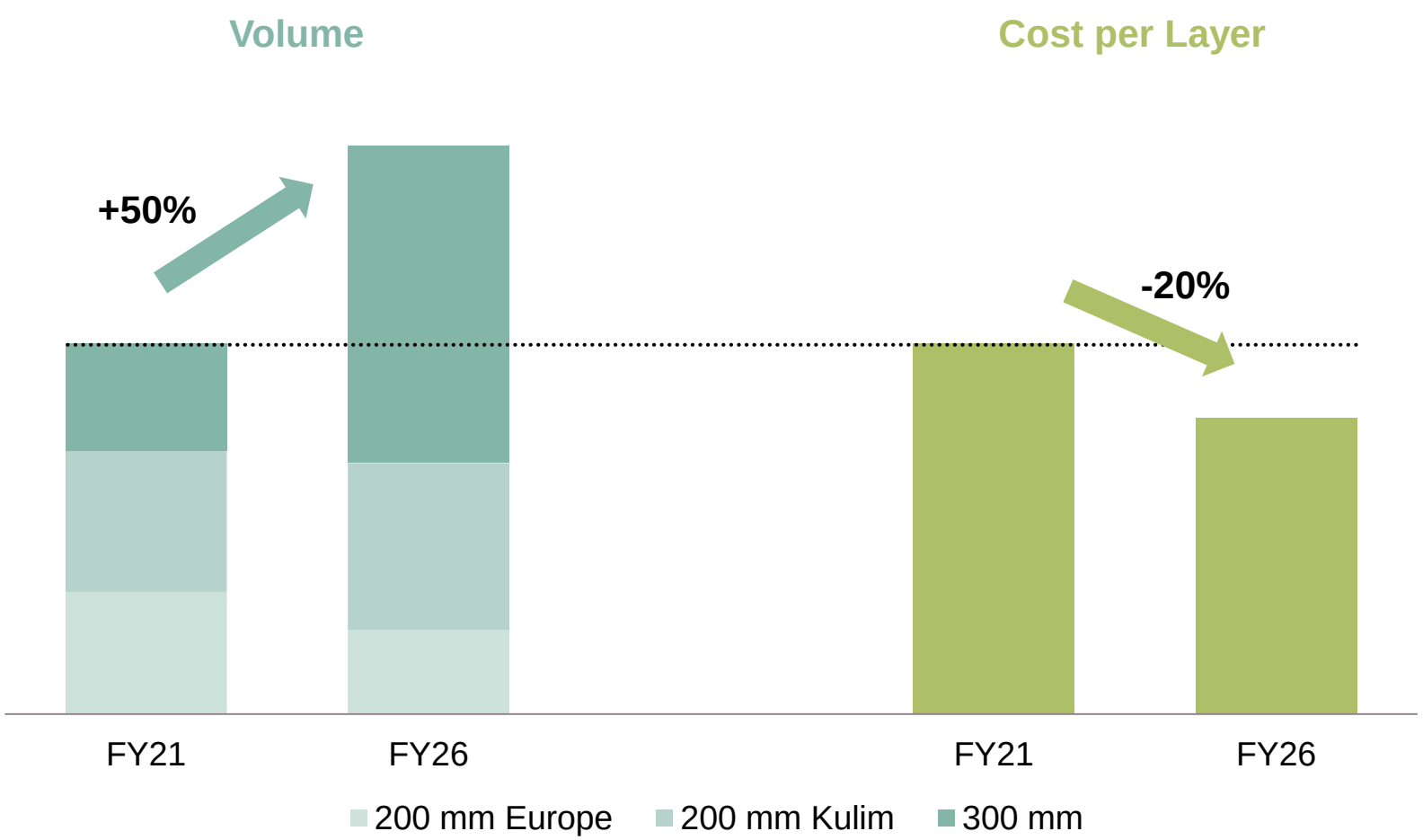
”One Virtual Fab” concept:

- Increased manufacturing flexibility
- Faster time-to-market for volume manufacturing
- Higher economies of scale



Strong growth and excellent cost position of our target manufacturing setup improve frontend productivity for power and sensors

Advantages of 300 mm



- Largest cost leverage through volume increase and resulting economy-of-scale effects in 300 mm
- Excellent cost position for 200 mm Kulim
- Share of 200 mm in Europe declining

SiC and GaN capacity expansion to respond to fast growing demand

Villach, Austria

- 150/200 mm Si lines will be converted to SiC and GaN manufacturing while reusing non specific equipment
- → SiC capacity secured in Villach
- → GaN scaling-up to volume manufacturing

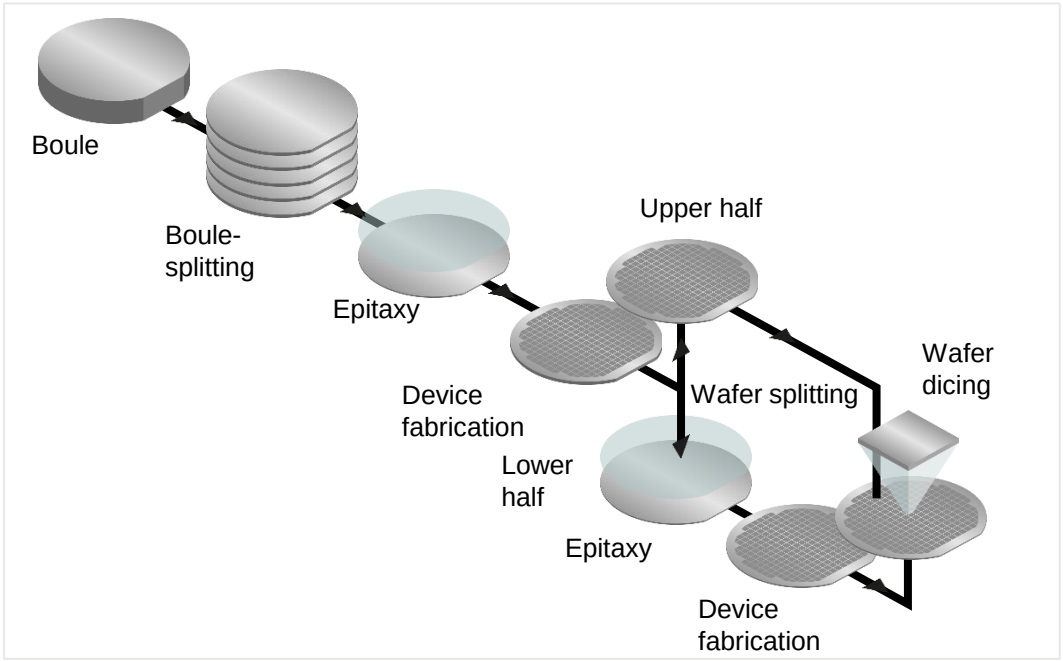
Further expansion in Kulim

Kulim, Malaysia

- Transfers of
  - 200 mm Si
  - WBG epitaxy as first step
- Ground ready for 3rd module

Our Cold Split technology leads to significant reduction of raw material losses during SiC manufacturing

Cold Split technology



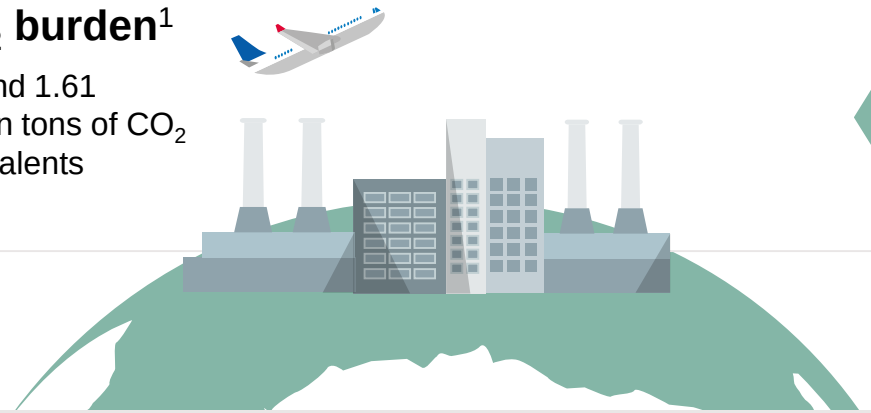
- First product qualified on Cold Split technology
- Ramping pilot line and prepare volume production
- 3 supplier LTAs for boules and wafers in place

	Crystal › Technology	# of wafers (indexed)
Today	SiC boule — Sawing Grinding	1x
	Traditional wire sawing wastes ~75% of raw material!	
2021	SiC boule — Boule Splitting Grinding	Up to 2x
	Boule splitting reduces raw material losses by 50%!	
Next step	SiC wafer — Wafer Splitting	2x
	Wafer splitting results in minimal raw material losses!	

We contribute a net CO_2 reduction of more than 54 million tons

CO_2 burden[1]

Around 1.61 million tons of CO_2 equivalents



Ratio ~1:35

CO_2 savings[2]

Around 56 million tons of CO_2 equivalents

Net ecological benefit: **CO_2 emissions reduction of more than 54 million tons**

Infineon is excellent in resource efficiency

We are committed to CO_2 neutrality by 2030

Our CO_2-saving applications are high-growth, we are part of the solution!

The 1:35 ratio is expected to further improve in the coming years

1 | **2** For explanatory notes see “ESG footnotes” in the appendix.

Infineon is excellent in resource efficiency and committed to CO_2 neutrality – sustainability is in our DNA

Infineon ranks among the 10 percent[1] most sustainable companies in the world

In CY19, we used resources in our manufacturing processes much more efficiently than the global average of the semiconductor industry[1]:

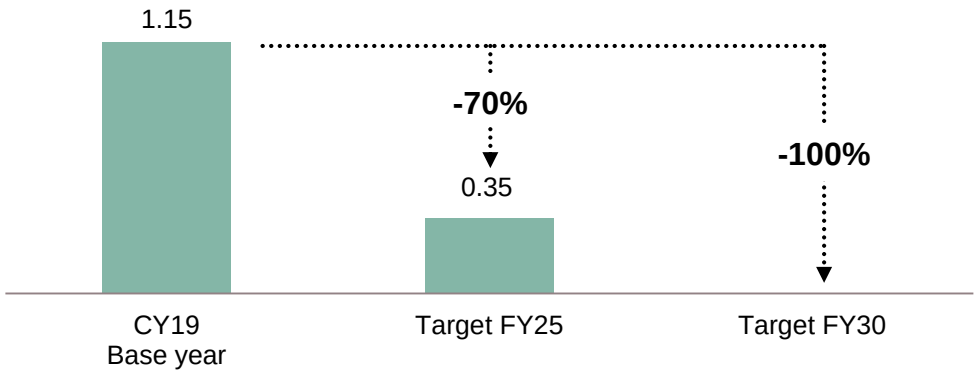
53%
less electricity consumed
per cm² manufactured wafer

31%
less water consumed
per cm² manufactured wafer

66%
less waste generated
per cm² manufactured wafer

Infineon's CO_2 target[2] by 2025 and 2030

Net CO_2 emissions in million tons of CO_2 equivalents[2]



1. Avoiding direct emissions and further reducing energy consumption
2. Purchasing green electricity with guarantees of origin
3. Compensate the smallest part by certificates that combine development support and CO_2 abatement

1 Based on the results of *The Sustainability Yearbook 2020* by S&P Global in cooperation with RobecoSam
2 Related to Scope 1 and 2 emissions

High-growth applications offer further additional CO_2 savings potential

In CY20:

Wind energy: Annual installation capacity increased over 80%[1]

PV energy: Annual installation capacity increase of ~15%[2]

Drives: Increasing penetration of more efficient drives[3]

EVs: Increased sales contributed to an average fleet emission reduction of 14 g/km in Europe[4]

Net ecological benefit increases over time

1 Wood Mackenzie: *Global Wind Power Market Outlook, Q2 2021*. June 2021
2 Based on or includes content supplied by IHS Markit Climate and Sustainability Group: *PV Installations Tracker, Q2 2021*. June 2021
3 Based on or includes research from Omdia*: Industrial Motor Control Sourcebook 2020.* December 2020
4 CO_2 emissions from new passenger cars in Europe: Car manufacturers' performance in 2020 - 08/2021

Infineon is making Electrification happen

- Global leadership in powering renewables, xEV, and data center
- Broadest solution portfolio across Si, SiC, GaN

CoolSiC™
CoolGaN™

SiC/GaN capacity expansion underway – to meet structurally growing demand

Only player operating two large-scale 300 mm fabs for power semiconductors

Part of the solution: 1:35 net ecological benefit – CO_2 neutrality by 2030

Part of your life. Part of tomorrow.