Electrification and Digitalization

Electrification
› CO₂ 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

<table>
<thead>
<tr>
<th>Application</th>
<th>2021</th>
<th>2022</th>
<th>2023</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fossil, nuclear, hydro</td>
<td>2,000</td>
<td>3,500</td>
<td>2,500</td>
</tr>
<tr>
<td>Wind</td>
<td>2,000</td>
<td>5,000</td>
<td></td>
</tr>
<tr>
<td>Solar</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Additions in 2020 [GW]

- Fossil, nuclear, hydro: 2,000
- Wind: 3,500
- Solar: 5,000
- Storage: 2,500

Global cumulated additions in solar power capacity until 2030.

- Net Zero Emissions scenario: 4,200 GW
- Sustainable development scenario: 2,400 GW

Upside potential: example solar power

- Based on or includes content supplied by IHS Markit Climate and Sustainability Group: Grid Connected Energy Storage Market Tracker H1 2021. August 2021
- 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

<table>
<thead>
<tr>
<th>Year (e)</th>
<th>2020</th>
<th>2022e</th>
<th>2024e</th>
<th>2026e</th>
<th>2028e</th>
<th>2030e</th>
</tr>
</thead>
<tbody>
<tr>
<td>[m units]</td>
<td>5</td>
<td>4</td>
<td>9</td>
<td>9</td>
<td>13</td>
<td>15</td>
</tr>
</tbody>
</table>

- September 2019 estimate
- August 2021 estimate

### 2021 average xEV semi content

<table>
<thead>
<tr>
<th>Application</th>
<th>2021 average semi content $(\text{[m units]})$</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICE</td>
<td>~$490</td>
</tr>
<tr>
<td>MHEV</td>
<td>~$600</td>
</tr>
<tr>
<td>FHEV</td>
<td>~$890</td>
</tr>
<tr>
<td>PHEV, BEV</td>
<td>~$950</td>
</tr>
</tbody>
</table>

### Incremental power semi by application

- OBC, DC-DC, BMS, auxiliaries, analog
  - ~75%
- Inverter
  - ~25%

1. Based on or includes content supplied by IHS Markit Automotive: *Alternative Propulsion Forecast*. September 2019, August 2021.
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

| PHEV and BEV cars in 2021: ~6m units |

| Share of inverters equipped with Infineon chips or modules |

### Ex. of OEMs powered by Infineon

- Volkswagen
- German Luxury OEM
- NIO
- Mini
- Cadillac
- SAIC
- Nissan
- Renault

### Examples of SiC design-wins

- Hyundai
- US OEM
- Asian OEM
- XPeng

- 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

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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**
- Photovoltaic
- EV charging
- Industrial power supply
- Transportation
- Drives

**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

**Customers**

Infineon serves

> 3,000 industrial customers directly or via distribution
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

FY20
FY21e
FY22e
Mid-20ies

Automotive
Industrial

~100%
>90%
~200m

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GaN technology – Infineon well positioned to address key markets

GaN market forecast¹

<table>
<thead>
<tr>
<th>Year</th>
<th>Forecast Value (USD m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020</td>
<td>47</td>
</tr>
<tr>
<td>2025e</td>
<td>801</td>
</tr>
</tbody>
</table>

**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

**Applications**

**Focus applications**

- Charger
- Telecom
- Motor control

**Emerging applications**

- Audio amplifier
- Major home appliance
- Storage

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

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

<table>
<thead>
<tr>
<th></th>
<th>2020</th>
<th>2025e</th>
</tr>
</thead>
<tbody>
<tr>
<td>AI-enabled hyperscalers</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>hyperscalers</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>telecom &amp; edge</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>enterprise</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

Power requirement per server

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
</table>
| Power¹:
| ~3x    |
| ~1.5x  |
| ~1.0x  |

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

- 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**

- **Volume**: +50%
- **Cost per Layer**: -20%

- 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

- Boule splitting reduces raw material losses by 50%!
- Our Cold Split technology leads to significant reduction of raw material losses during SiC manufacturing.

Traditional wire sawing wastes ~75% of raw material!

<table>
<thead>
<tr>
<th>Crystal</th>
<th>Technology</th>
<th># of wafers (indexed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SiC boule</td>
<td>Sawing Gridding</td>
<td>1x</td>
</tr>
<tr>
<td>SiC boule</td>
<td>Boule Splitting Gridding</td>
<td>Up to 2x</td>
</tr>
<tr>
<td>SiC wafer</td>
<td>Wafer Splitting</td>
<td>2x</td>
</tr>
</tbody>
</table>

Next step

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

Wafer splitting results in minimal raw material losses!
We contribute a net CO₂ reduction of more than 54 million tons

CO₂ burden
Around 1.61 million tons of CO₂ equivalents

Ratio ~1:35

CO₂ savings
Around 56 million tons of CO₂ equivalents

Net ecological benefit: CO₂ emissions reduction of more than 54 million tons

Infineon is excellent in resource efficiency
We are committed to CO₂ neutrality by 2030
Our CO₂-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 CO₂ neutrality – sustainability is in our DNA

Infineon ranks among the 10 percent¹ 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 industry¹:

- 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 CO₂ target² by 2025 and 2030

Net CO₂ emissions in million tons of CO₂ equivalents²

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

1.15
-70%
-100%
0.35

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 CO₂ abatement
High-growth applications offer further additional CO₂ 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 drives³

**EVs**: Increased sales contributed to an average fleet emission reduction of 14 g/km in Europe⁴

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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 CO₂ 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

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 – CO₂ neutrality by 2030
Part of your life. Part of tomorrow.