Infineon Technologies for Hydrogen based Power Conversion/generation

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The four key trends to drive semiconductor growth

Energy efficiency

Power devices and subsystems for breakthrough advances in efficiency

Mobility

Super efficient and reliable semiconductors for electrification and CO_2 reduction

Security

IoT & big data

Cutting-edge power solutions for hyperscale data centers, hedge computing and 5G

Wide band-gap (WBG) technologies complement silicon to meet the most demanding requirements

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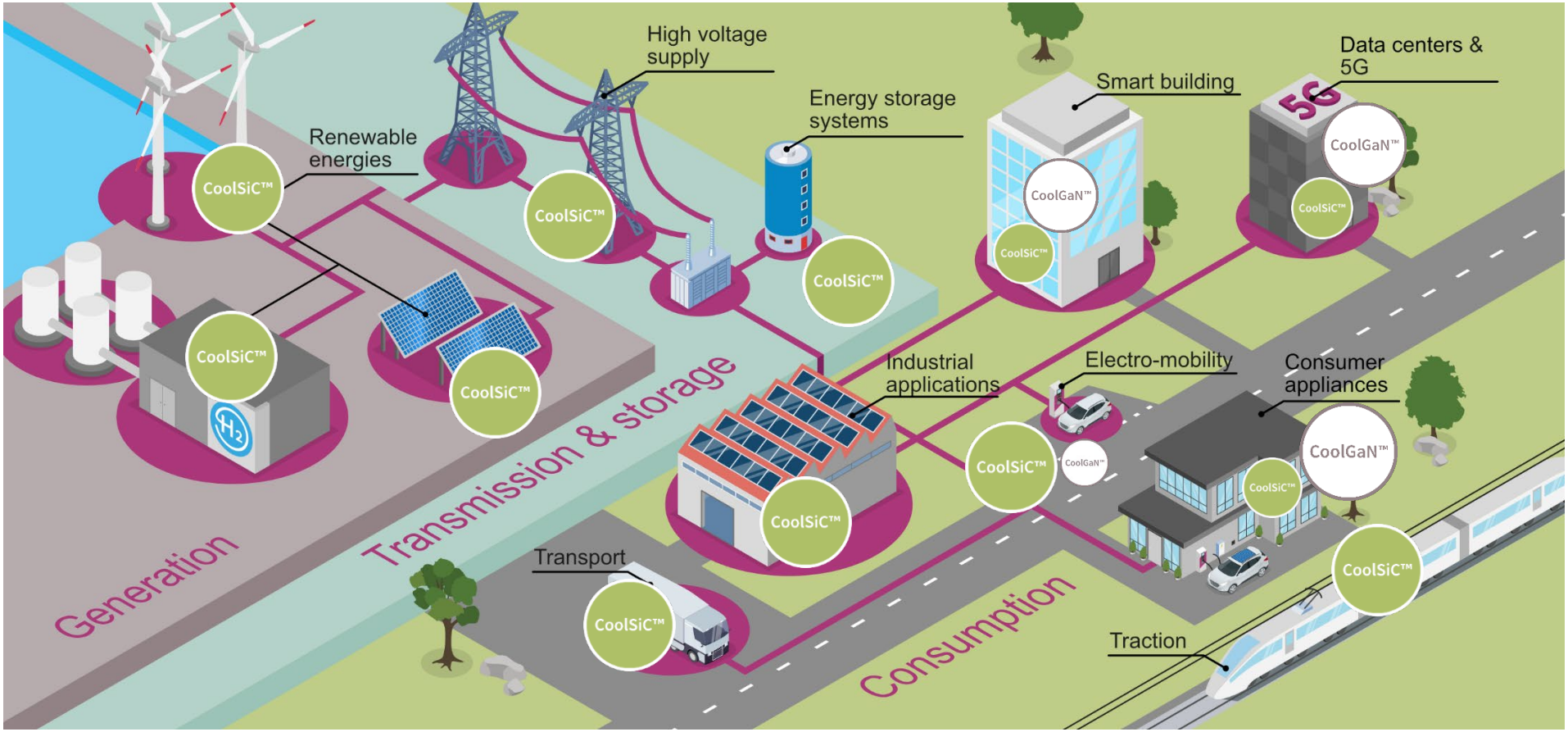
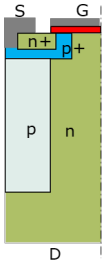
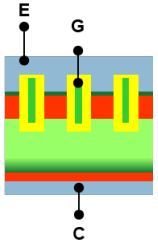
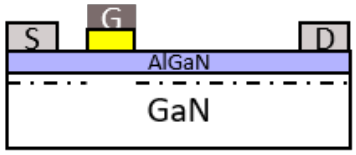
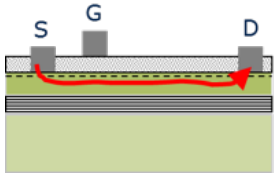
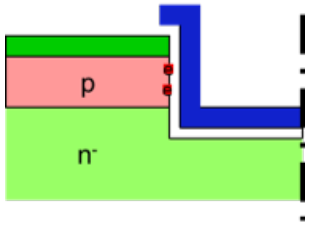
Infineon develops technologies that are linked to megatrends along the energy conversion chain, including Hydrogen



Infineon complements each of its leading edge silicon solutions with a wide-bandgap technology

OptiMOS™ to CoolGaN™	CoolMOS™ to CoolGaN™	TRENCHSTOP™ to CoolSiC™
		
Si Fieldplate	**Si Superjunction**	**Si IGBT**
		
GaN **MV e-mode lateral HEMT**	**GaN** **HV e-mode lateral HEMT**	**SiC MOSFET**

Si, SiC, and GaN Technologies cover a wide range of power/voltage /frequency

Silicon (Si)

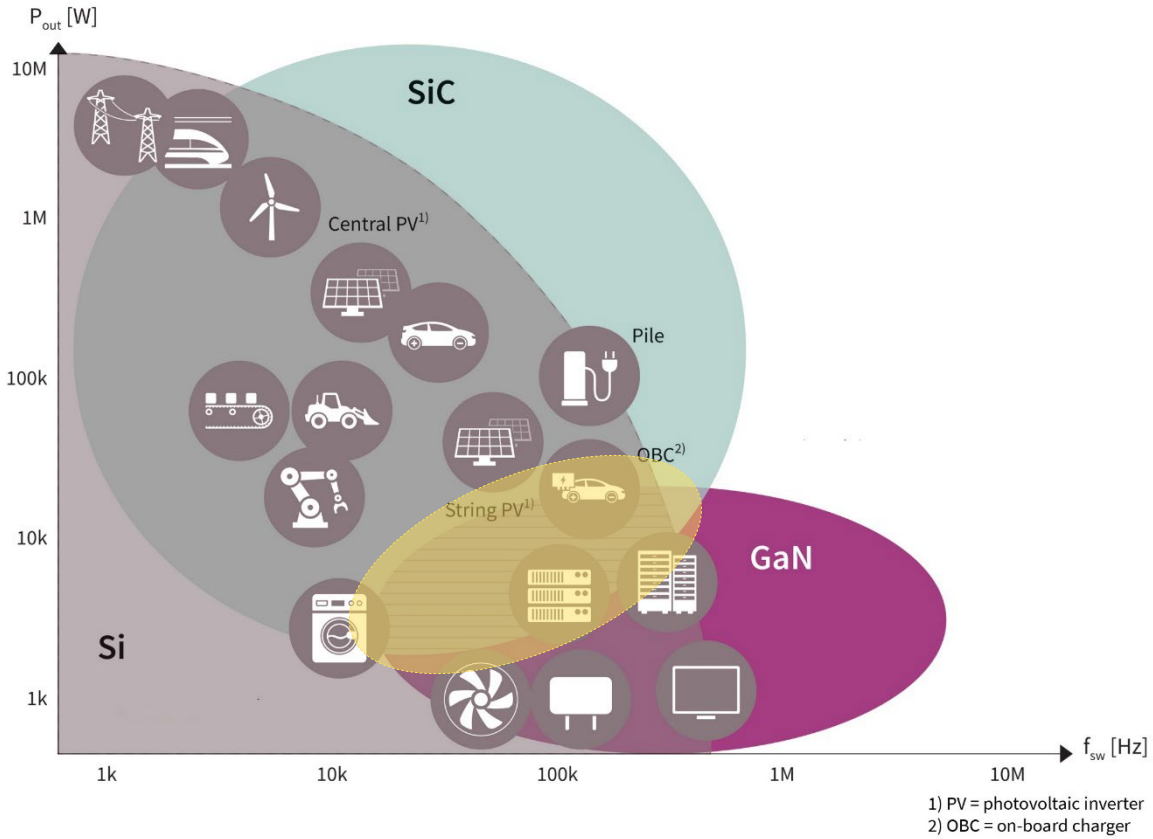
- Targeting voltages ranging from 25 V – 1.7 kV
- The mainstream technology
- Suitable from low to high power

Silicon carbide (SiC)

- Targeting voltages ranging from 650 V – 3.3 kV
- High power from moderate to high switching frequency

Gallium nitride (GaN)

- Targeting voltages ranging from 80 V – 650 V
- Medium power at highest switching frequency



600 V / 650 V segment

CoolMOS™, CoolSiC™ and CoolGaN™ coexists, addressing applications such as:
Datacenter and telecom SMPS, Industrial SMPS, solar inverters, energy storage, UPS, battery formation, EV charging, motor drives plus automotive applications like OBC (on-board charger)

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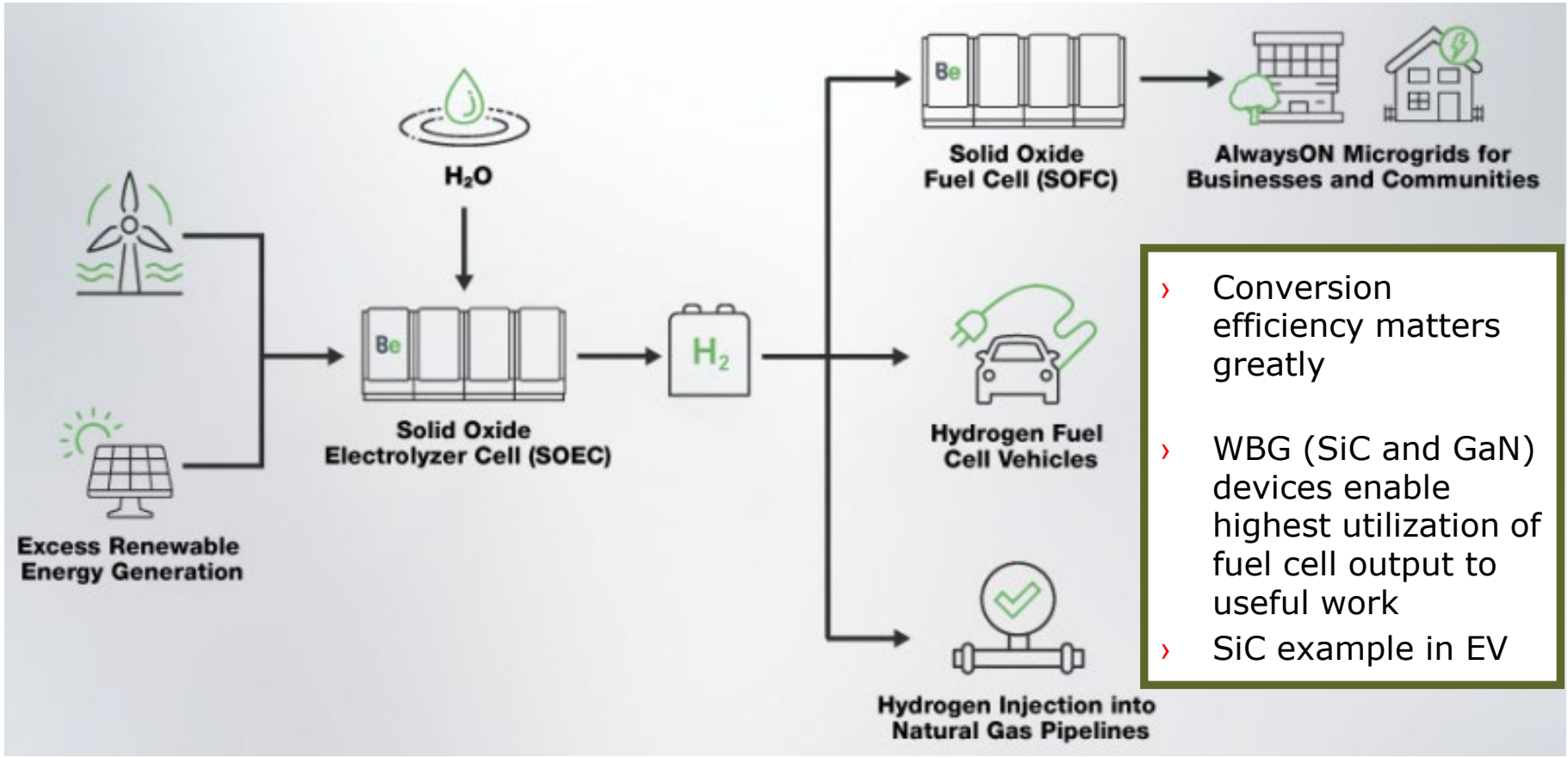
There are several „loads“ and power levels for fuel cell electricity generation



- Conversion efficiency matters greatly
- WBG (SiC and GaN) devices enable highest utilization of fuel cell output to useful work
- SiC example in EV

From https://www.greencarcongress.com/2020/07/20200720-bloom.html

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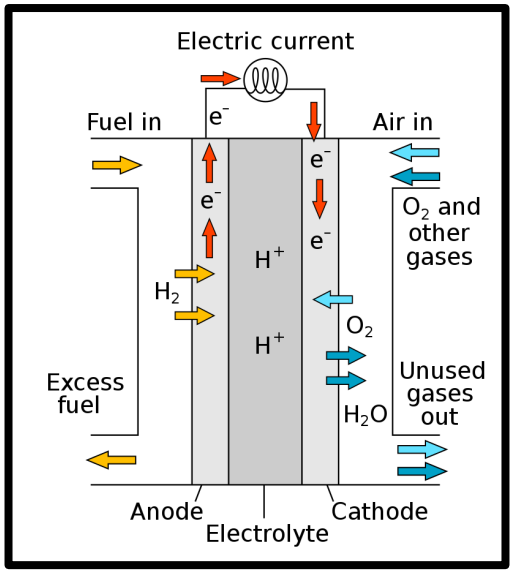
Power Converter is key link between Fuel Cell and useful work in vehicle or output to grid



From Wikipedia

Fuel Cell generates DC electricity at some current and voltage

- Vin = ?
- I in =?
- Vout =?
- I out = ?
- Frequency?
- Conversion results in some wasted power
- **Importance of efficiency**

Power Converter conditions electricity for specific applications (typically DC to AC)

Specific Application: Motor in FC based EV or grid
Converter outputs set to optimum application values
The less power is dissipated in conversion, the more useful work is realized from given fuel cell output

Specific Application: Vehicle motor or grid or?

Cost of fuel cell for a given application can be lowered by use of WBG devices since higher useful work results due to higher conversion efficiency

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