SiC Power Electronics in Medium Voltage Motor Drives
Trade and Manufacturing Analysis

SiC Simplified Value Chain for Medium Voltage Variable Frequency Drive & Regional Cost and Manufacturing Analysis

Bottoms-up Regional Manufacturing Costs and Modeling Assumptions
- Regional costs are computed for each manufacturing processes based on input data from materials and equipment suppliers and manufacturers.
- MSP is the minimum sustainable price that a company must not produce in order to pay back the capital and operating expenses during the plant lifetime.
- Manufacturing cost modeling base case:
  - Modeled the effect of core country factors:
  - Effective corporate tax rates
  - Electricity prices
  - Manufacturing competitiveness is less driven by core country factors, but this may change over time.

Techno-economic Modeling Can Help Inform Research and Investment
- Analytically model costs instead of using antitodal references.
- Help guide research and manufacturing advancements.
- Understand impact before committing development resources.

Material Cost Summary
- Majority of SiC Power Module manufacturing cost is material cost.
- Currently SiC Devices are 40% of the material cost.
- Potential cost reduction scenario reduces manufacturing cost 33%.
- SiC Devices become 49% of cost.

Potential SiC-based 1MW VFD
- Hypothetical, no known products available on the market.

For more detailed information on our assumptions, see our accompanying technical report:

"Global Cost and Competitiveness Issues in Manufacturing SiC Power Electronics for Medium Voltage Motor Drives,"
NREL/TP-6A20-67694 (Feb. 2017)
http://www.nrel.gov/docs/fy17osti/67694.pdf

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