

## FASTLANE : Life Cycle Analysis of SiC from Substrate to Converter

### STUDY OBJECTIVES

#### COLLECTING DATA ALONG THE VALUE CHAIN

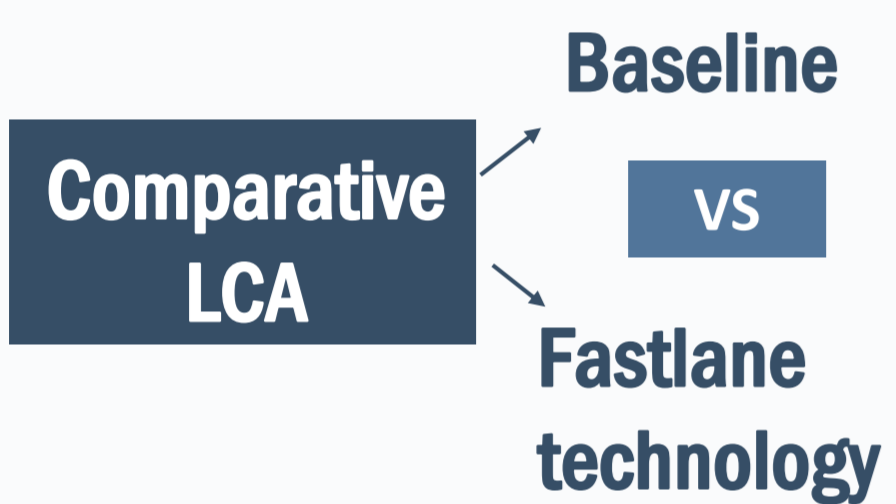
**Scarce data** on SiC environmental impacts

- Only very few papers have thoroughly studied the impacts of SiC
- Only **energy** and **yields** considered
- Lack of **Primary data**

#### COMPARING TECHNOLOGIES

From **SiC Powder to System**

Evaluate the **environmental improvements** brought by the technologies developed in Fastlane



##### Material level

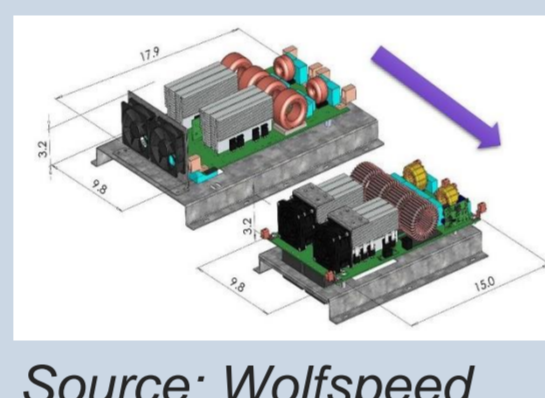
"Energy demand is **20 to 40 times** higher per usable wafer area for growing SiC boules than for Si ingots" [1]

##### Device level

Smaller SiC chip area per ampere required vs Si

##### System level

SiC MOSFET : increased efficiency + "enabling up to 70% higher power density compared to Si"



Source: Wolfspeed

#### DECREASING ENVIRONMENTAL IMPACTS

→ Identify hotspots of SiC Manufacturing to decrease them

[1] Triana D., A "life cycle thinking" approach to assess differences in the energy use of SiC vs. Si power semiconductors. In Proceedings of the e.nova 2021 Conference "Green Deal, Energy Building Environment", 12 February 2022; p. 10.

### MAIN CHALLENGES



Confidentiality issues : LCA requires partners to share sensitive internal data related to their processes



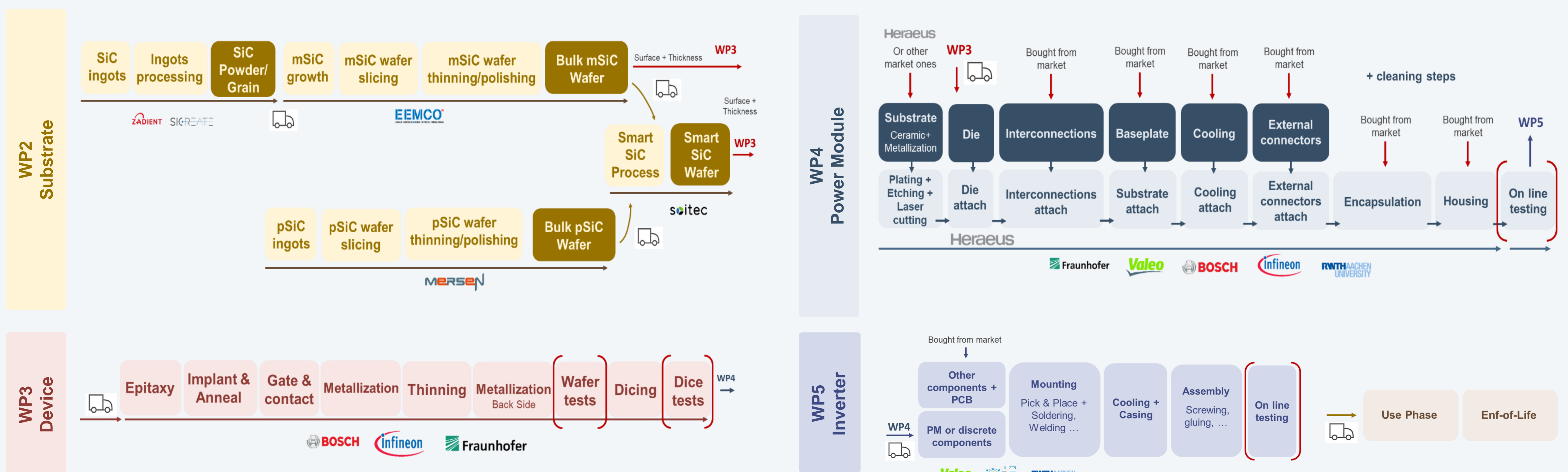
Very complex and time consuming to model some of the steps



Maintaining a consistent methodology throughout the value chain given that :

- Each WP with its own different constraints and process complexity
  - Lack of experience in LCA by most partners
  - Partners diversity in term of size and maturity
- Different data collection methodologies and LCA databases are used amongst partners

### METHODOLOGY



Steps considered in the LCA

From 2024 to 2027

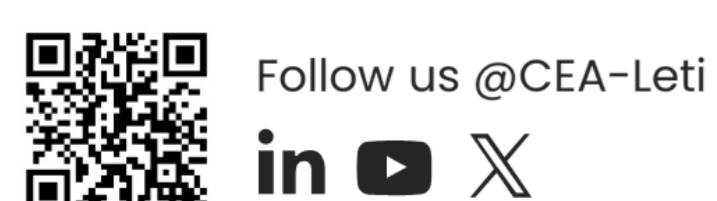
Collection of Primary Data from partners

Development of tools to easily compute environmental impacts based on Bill of Materials

CEA and Enea carry out the LCAs using PEF 3.1 methodology

#### Auteurs

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More info on : <https://fastlaneproject.eu/en>

