Inverter Cost Analysis and Market Intelligence

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Project ID #
APE032

SYNTHESIS PARTNERS, LLC

Overview

Timeline

- Start: Aug. 2010
- Finish: Aug. 2011
- Percent complete: 50%

Budget

- Total project funding: $235K base with option years
- Funding for FY11: $235K

Barriers Addressed

- Reduce APEEM electric propulsion system costs from $33/kilowatt (kW) to target costs of $12/kW peak by 2015 and to $8/kW peak by 2020
- US manufacturing of advanced Li-ion HEV/PHEV battery systems
- Automated search in support of Beyond Rare Earth Magnets (BREM)

Partners

- Interactions/ collaborations:
  - OEMs, Tier 1 and 2 suppliers, ORNL, University of Maryland, Ames Research Lab, VivoMind™ Research, LLC
- Project lead: Synthesis Partners, LLC

Study Objectives

- **Inverter Cost Analysis:** Aug. 2010-Aug. 2011
  - Relevance: Identify cost-drivers and paths to significant inverter cost reductions to support $12/kW peak by 2015
- **Lithium-Ion Battery Electrolytes Market Analysis and Supply Projections:** Mar. 2011-Aug. 2011
  - Relevance: Assess how US industry might meet future demand for Lithium Ion electrolytes, given expected significant increase in demand due to automotive and other uses over the next five years (through 2016).
- **Beyond Rare Earth Magnets (BREM) Automated Search Pilot Demo:** Apr. 2011-Aug. 2011
  - Relevance: Test and evaluate results of proprietary automated semantic search technology as accelerator for extraction of technical, quantified data regarding magnetic properties, functions and metrics that may be similar to neodymium iron boron magnets and have higher temperature limits.

Project Milestones

- **Inverter Cost Analysis**
  - Aug.'10 – Mar. 2011: Collection & Analysis (in progress)
  - Apr. – May 2011: Initial Results
  - June – Aug. 2011: Final Report
- **Lithium-Ion Battery Electrolytes Market Study**
  - Mar. – May 2011: Collection & Analysis (in progress)
  - June 2011: Initial Results
  - Aug. 2011: Final Report
- **Beyond Rare Earth Magnets (BREM) Automated Search Pilot Test**
  - Apr. – June 2011: Demonstration (in progress)
  - July – Aug. 2011: Final Report

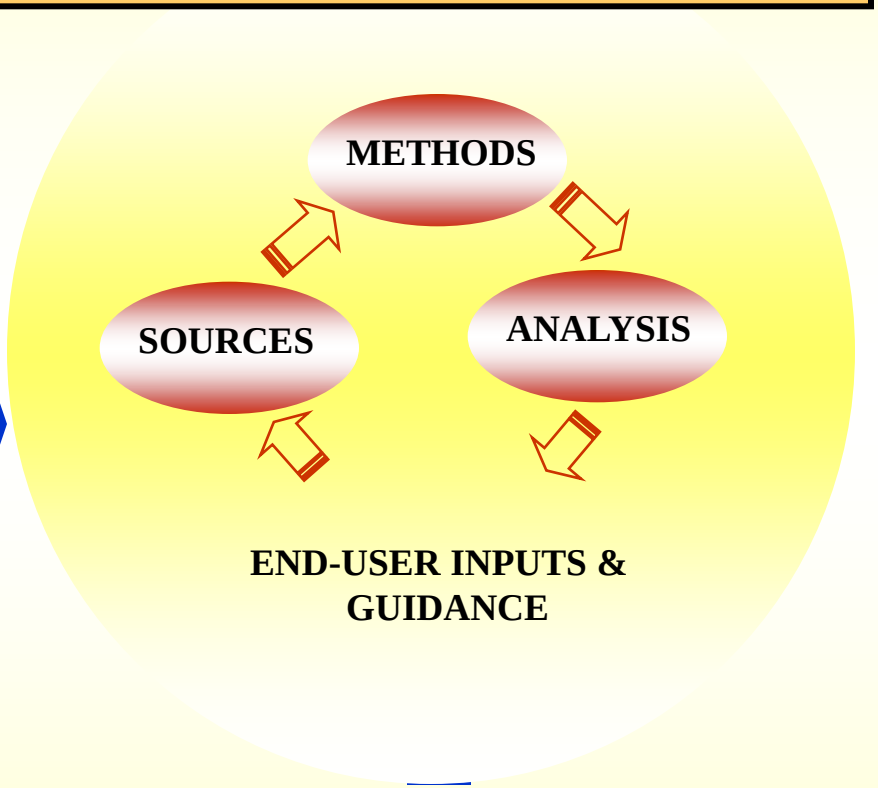
Approach/Strategy

Fast Iteration with Customer

Define

Refine, Frame and Focus Core Concerns

Customized by Question, Domain and End-User Requirements

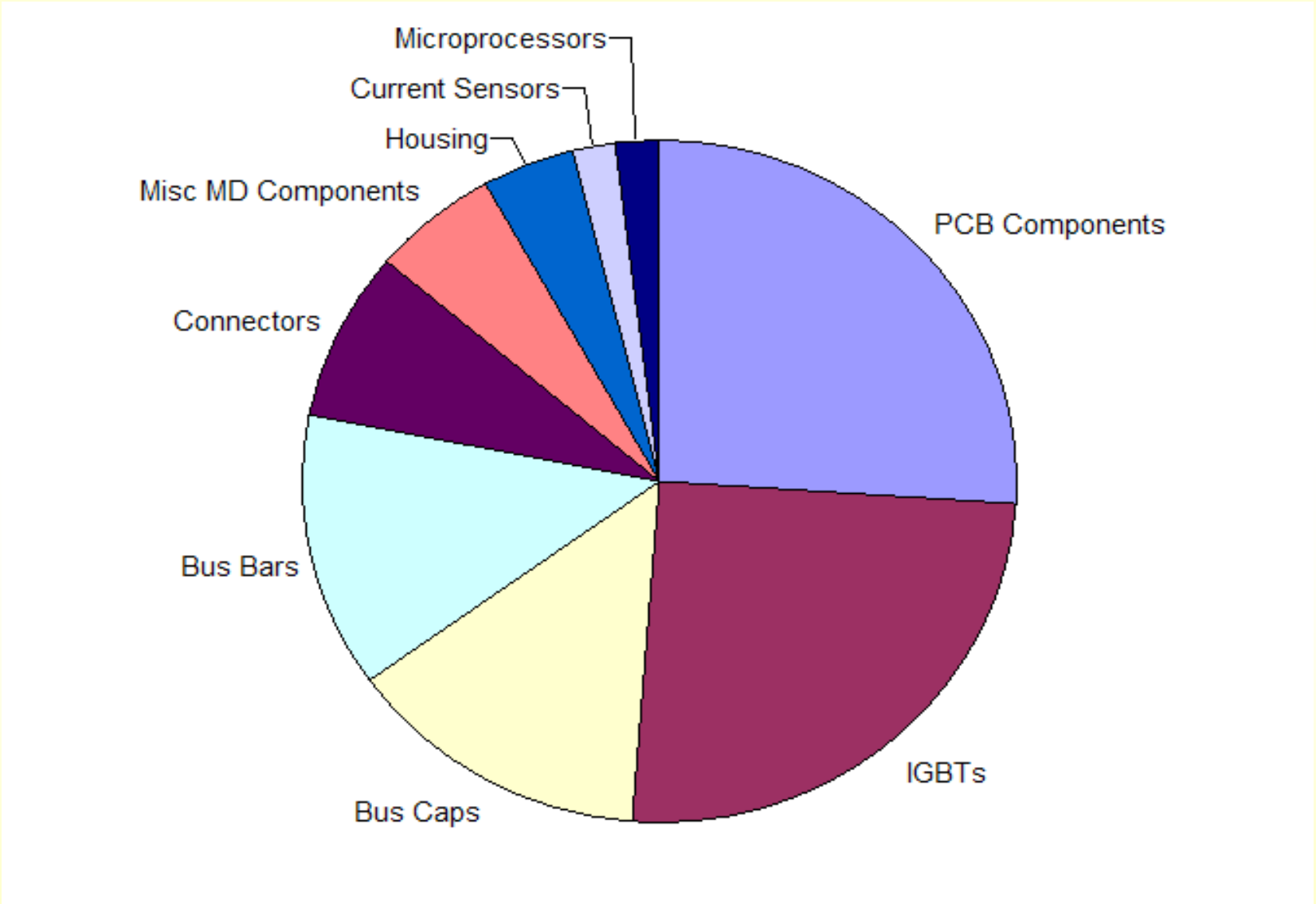


MARKET INTELLIGENCE

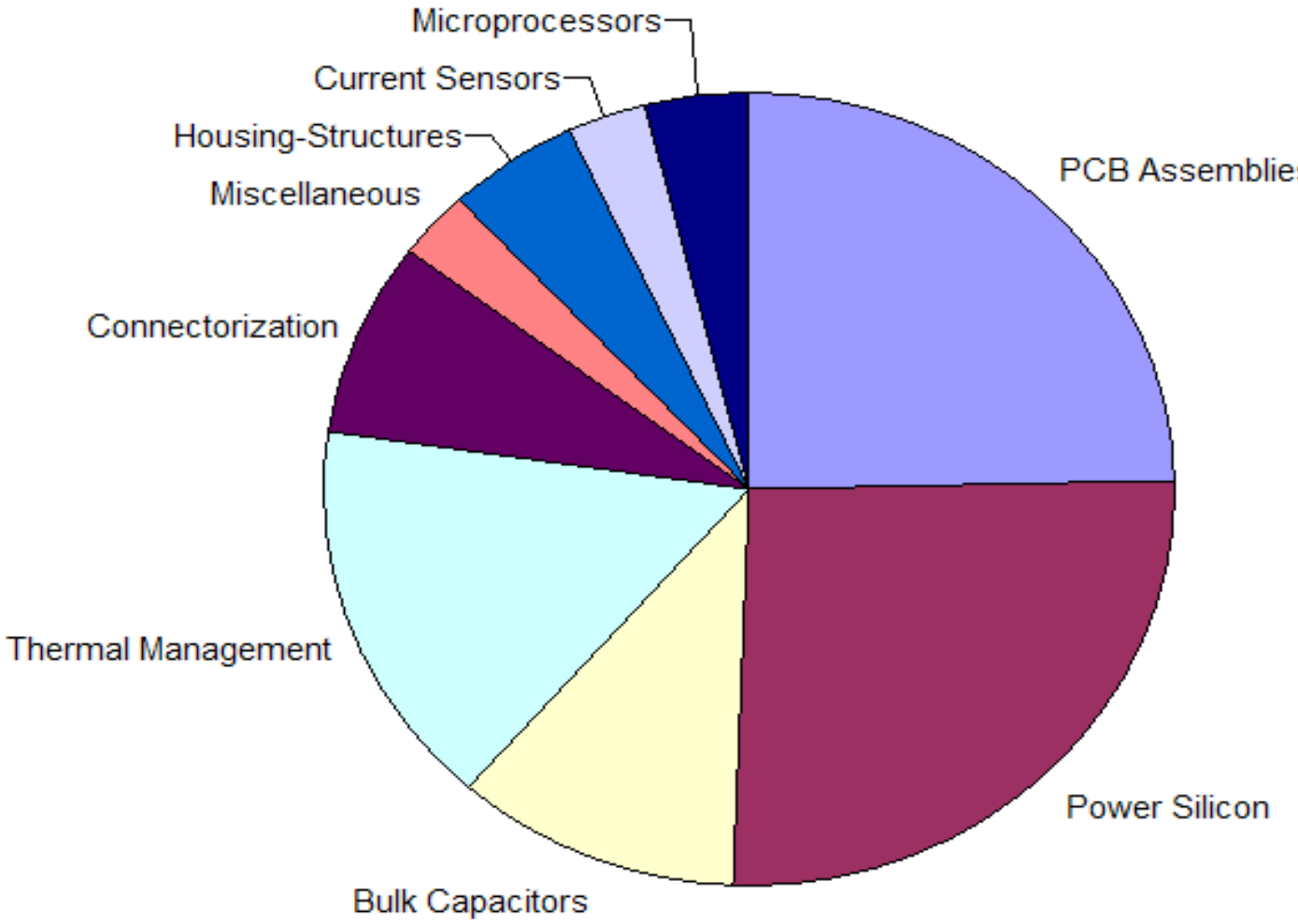
Inverter Cost Analysis Results

- Detailed findings under development
- Following slides provide initial findings
  (Data provided as of March 11th and subject to change.)
- Discussion will clarify context of data and provide interpretation of chart information

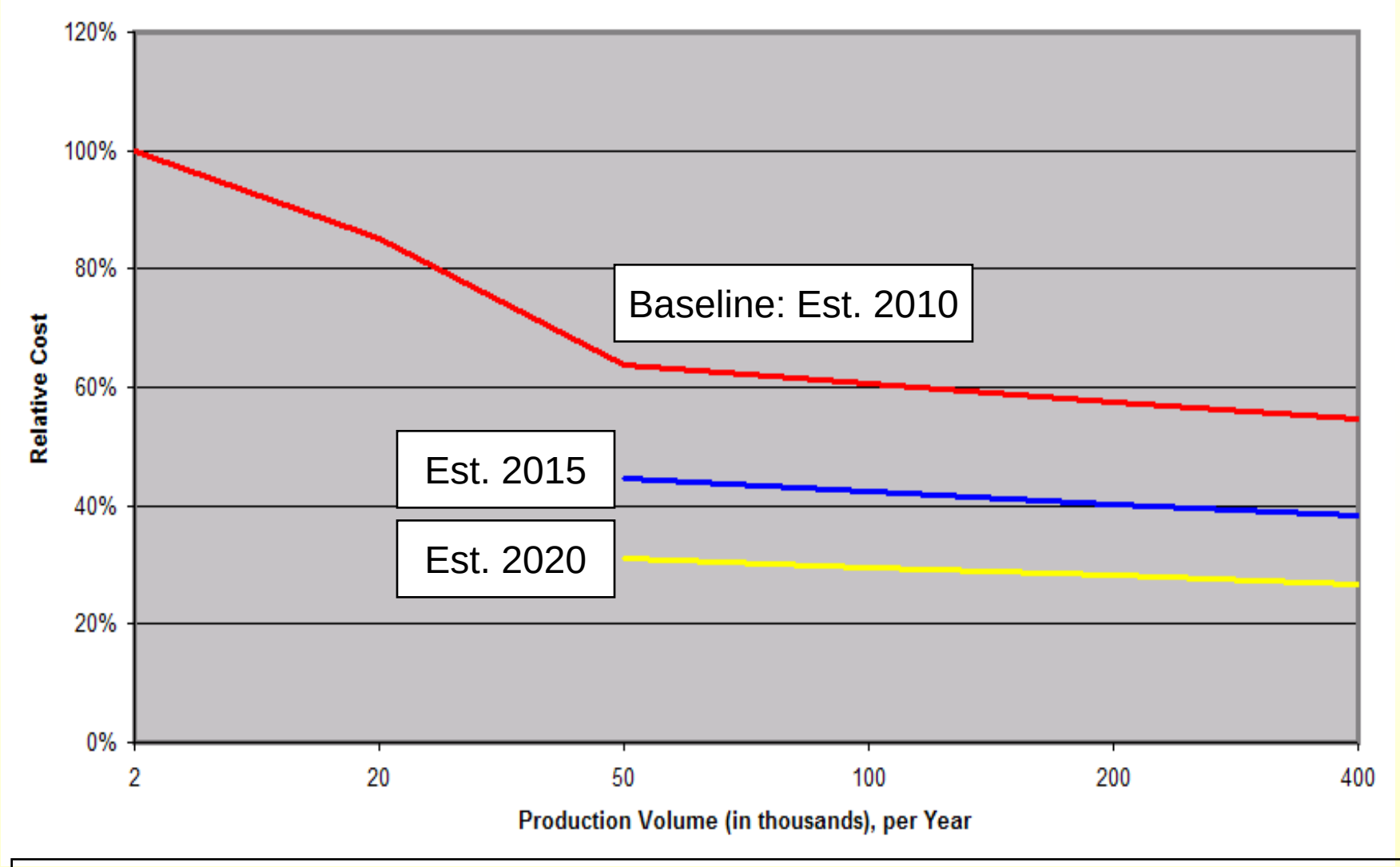
Current Power Inverter Cost Drivers



Projected Future Power Inverter Cost Drivers – to 2016



Per-Unit Costs of Power Inverters, by Five Year Design Cycles



Lithium-Ion Battery Electrolytes Market Study Results

- Research began at time of delivery of these slides.

BREM Automated Search Results

- Demo in process
  - Addressing up to 500 materials science S&T journal articles
  - Automated semantic extraction and fusion of selected materials science properties, functions and metrics from the texts
    - SME-guided selection and validation
- Intended outcomes
  - Accelerated discovery process
  - Proof-of-concept for other domains

BREM Automated Search Pilot Test

- Technology Approach
  - Societies of Intelligent Agents
    - Concurrent, parallel, distributed societies of agents working together to analyze semantics in texts
  - Uses ISO Standard Common Logic 24707
    - Conceptual Graphs knowledge representation, pioneered by John F. Sowa (founder of VivoMind™ Research, LLC)
  - Language and domain independent logical architecture addresses quantitative and qualitative semantic data
    - Synthesis Partners conceptualizes, designs and implements new intelligence processes; Agent technologies supplied by VivoMind™
- Potential Paths Forward
  - Handling noisy, corrupt data (e.g. conversions of PDF to text)
  - Scaling to larger data-sets (e.g. from 500 to millions)
  - New domains

Collaborations

- Close coordination and involvement with industry, universities, federal laboratories, and subject matter experts on both public and proprietary basis

- Collection from sources outside the VT Program to identify low-cost technology development opportunities in support of DOE goals

- Industry: OEMs, Tier 1 and 2 suppliers, ABB Semiconductors, ATS, Bosch, Semikron, UQM, US Hybrids, VivoMind™ Research
- University: U-MD, Illinois Institute of Technology
- Federal Research Labs: ORNL, Argonne, Ames

Proposed Future Work

- Discussions with DOE are on-going.

Mandatory Summary Slide

- Under development
  - Public Report with results from Inverter Cost Analysis
  - Public Report with results from Lithium-Ion Battery Electrolytes Market Study
  - Summary results from Beyond Rare Earth Magnets (BREM) Automated Search Pilot Test