

# SECA Core Technology Roadmap Development

March 29-30, 2001

Arlington, VA

by

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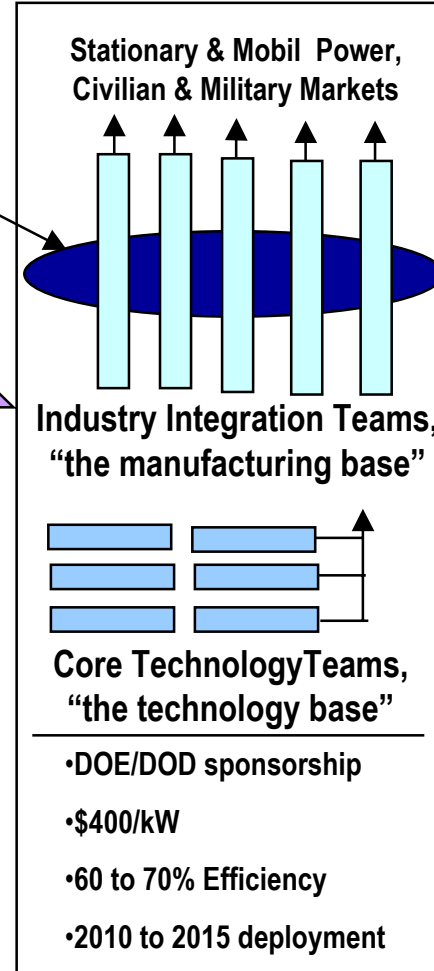
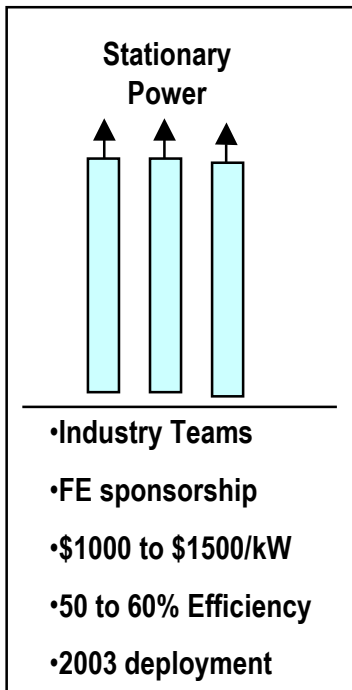
# SECA VISION

Solid State Energy Conversion Alliance

## - SECA R&D - A National Initiative

Mass Customization  
of Common Modules

### Existing R&D



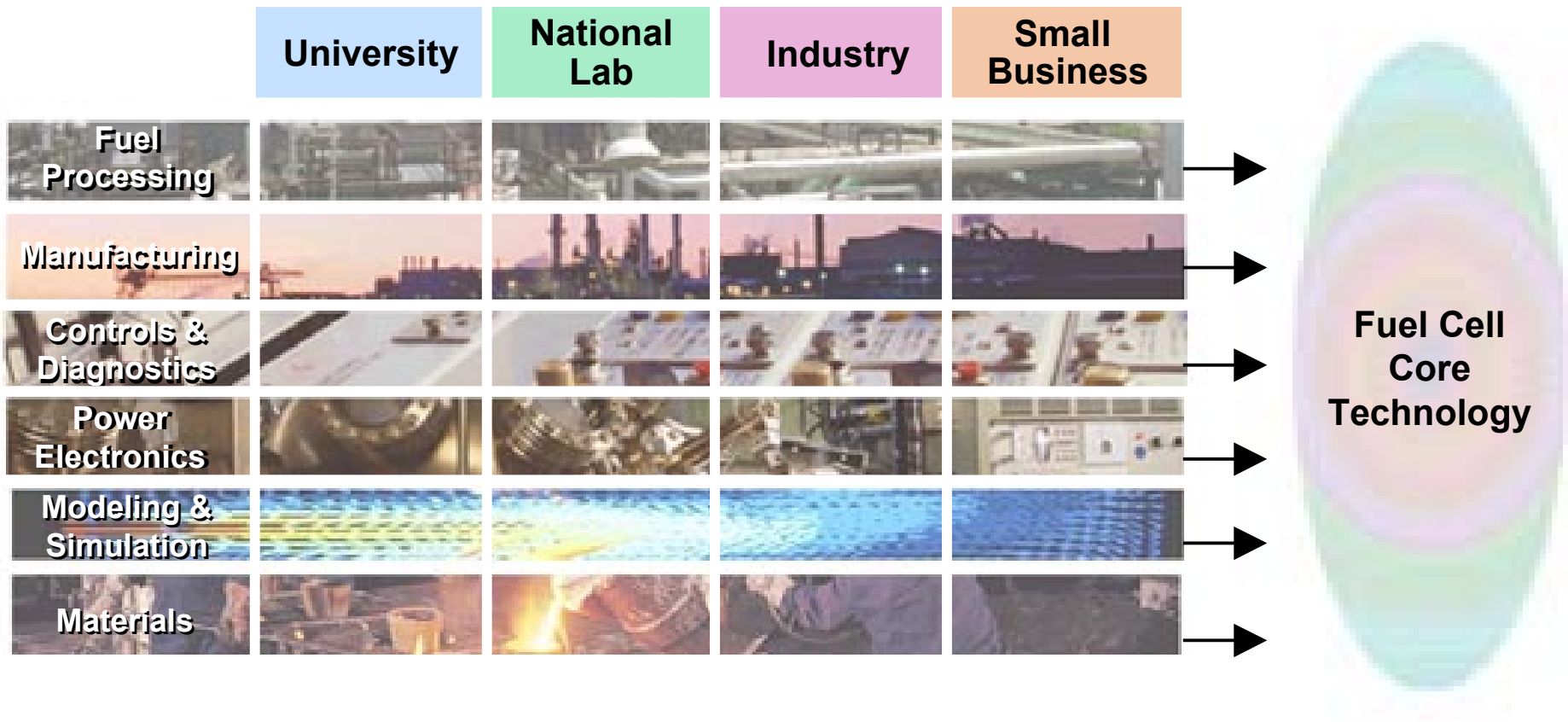
# SECA Core Technology Program

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- Overcome Technology Barriers That Enable Industrial Teams to Rapidly Progress Toward Low Cost SOFC System Development Consistent With SECA Goals
- Information Shared With All Industrial Teams
- Can Include Universities, National Laboratories, and Industries

# SECA Technology Program

## *The Technology Base*



# Summary of SECA Core Technology Program Planning Workshop

February 14-15, 2001

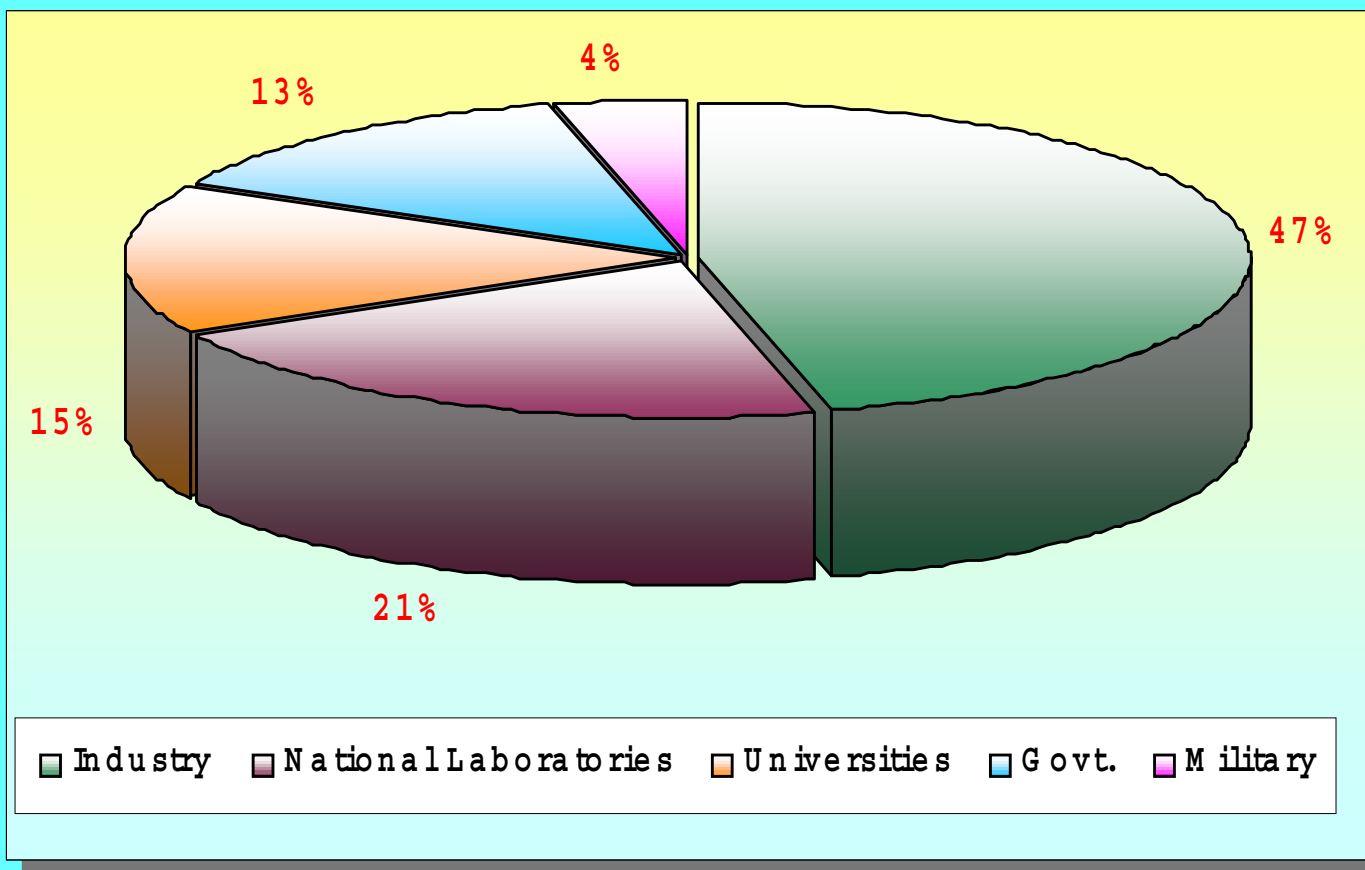
Atlanta, GA

Attendance: 54

# Workshop Results:

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## Workshop Participation by Affiliation



# Workshop Objective

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- To identify critical fuel cell and related system technology development needs to meet the SECA cost and performance targets of the advanced solid oxide fuel cell (SOFC) power generation systems

# Procedure

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- Establish current level of understanding
- Present “strawman” of technology needs or gaps between where we are and SECA goals
- Audience modifies strawman to reflect their perspective (predominantly industry)
- Prioritize
- 2<sup>nd</sup> day summarize and last chance to modify
- Prioritize overall technology gaps/needs



# Next Steps

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- Present results of this meeting to 2<sup>nd</sup> SECA meeting (March 29-30) to get broader perspective—modify if appropriate
- Use as a basis for core technology solicitations

# Topic Areas

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- Fuel processing technologies
- Cell/stack materials and manufacturing processes
- Stack/system performance and modeling
- Power electronics

# Establish Current Level of Understanding

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## ■ Fuel Processing Technologies

- “Fuel Cells for Transportation: Fuel Processing Technology,” Patrick B. Davis DOE-OTT Office of Advanced Automotive Technologies
- “Natural Gas Fuel Processing Experience and Issues,” Pinakin S. Patel, FuelCell Energy, Inc.
- “Diesel Reforming for Solid Oxide Power Generation,” David L. King, Pacific Northwest National Laboratory

## ■ Cell/Stack Materials and Manufacturing Processes:

- “SOFC Materials and Processing Issues,” Anil V. Virkar, Materials and Systems Research, Inc.

# **Establish Current Level of Understanding (cont).**

- **Stack/System Performance and Modeling:**
  - “Solid Oxide Fuel Cell System Development and R&D Needs,” Nguyen Ming, Honeywell, Inc.
  - “Solid Oxide Fuel Cell Auxiliary Power Unit: Status and Challenges for Automotive Applications,” Subhasish Mukerjee, Delphi Automotive Systems
- **Power Electronics:**
  - “Lower Cost Power Electronics Systems Blocks for DG and Automotive Applications,” Chris Kambouris, Ecostar

# Rankings

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- Fuel Processing:
  - Catalyst kinetics, parameters, deactivation
  - Fuel pre-reforming catalyst and methods
  - Sulphur-tolerant anodes
  - On-anode fuel utilization
  - Water and steam management
- Cell/Stack Materials and Manufacturing:
  - Stable interconnect
  - Fuel/oxidant seals
  - Cathode electrode/electrolyte interface
  - Thermomechanical modeling and tools
  - Internal reforming/direct oxidation

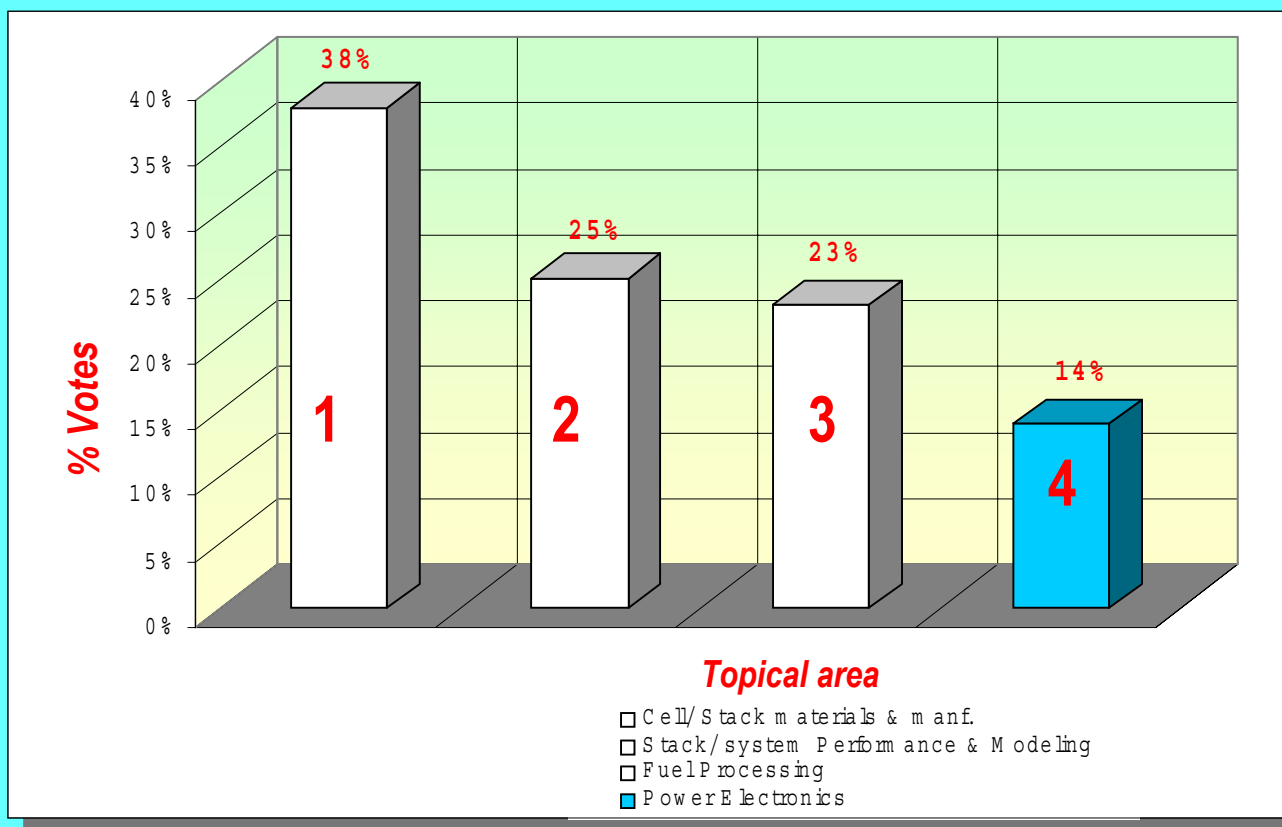
# Rankings (cont.)

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- **Stack/Systems Performance & Modeling:**
  - Cell and stack performance model; electrical and chemical model
  - Low-cost HX, insulation, blowers, sensors
  - Fast start-up and thermal cycling
  - System steady state and dynamic model
  - Start-up methods and materials to accomplish fast start-up
- **Power Electronics:**
  - Fuel cell/PE interface
  - Packaging
  - Sensors, diagnostics, and prognostics
  - Modeling: electrical interface
  - Materials and fabrication processes

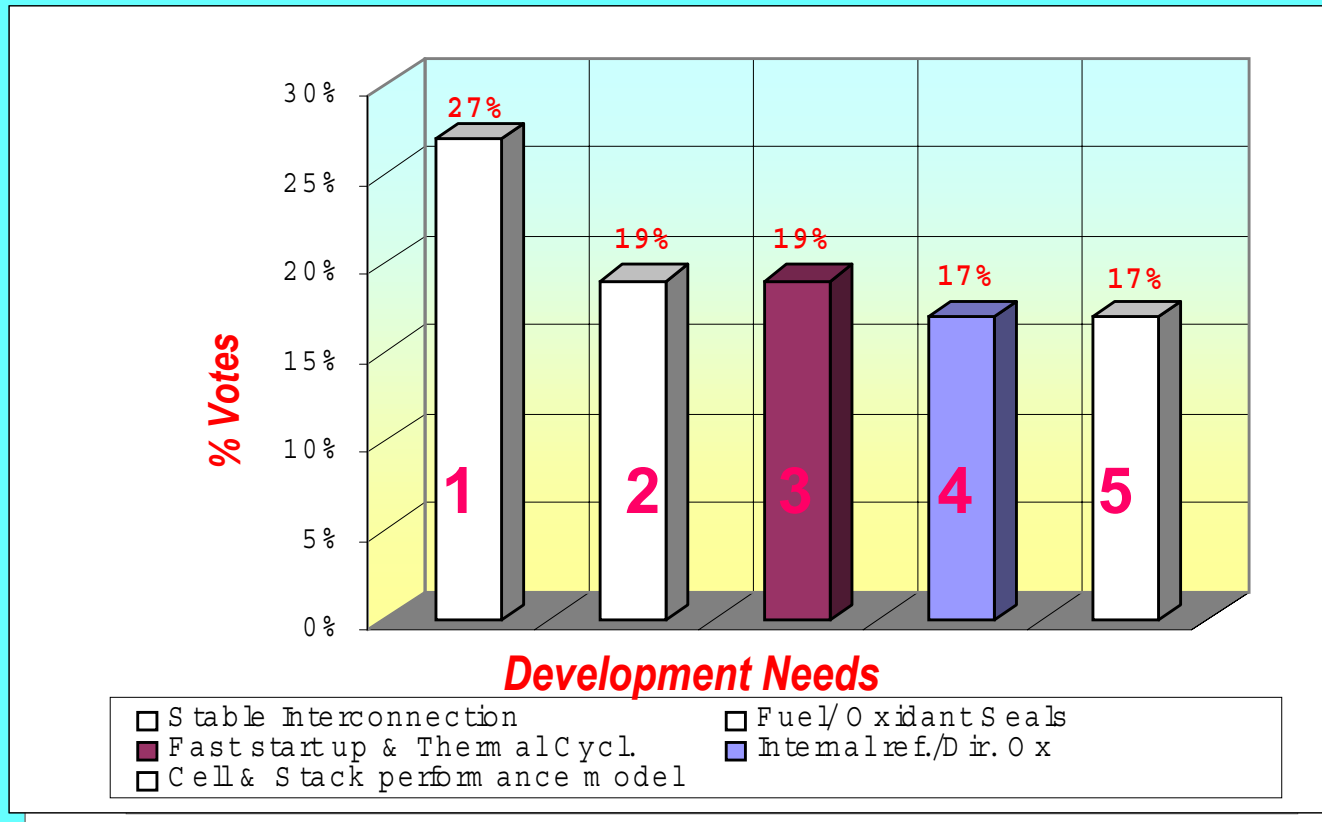
# Workshop Results:

## Ranking of Topical Area ( All workshop Participants)



# Workshop Results:

## Top 5 Development Needs Identified at the CTP Workshop (All Participants)





# Next Steps

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- Have summarized the Core Technology Program Planning Workshop...Now would like your input

---Breakout Sessions