Office of Fossil Energy Fuel Cell Program
$78.2.1M FY 05 Funding

Solid State Energy Conversion Alliance - SECA

Advanced Research

Fuel Cell Systems

Turbine / Fuel Cell Hybrids
Office of Fossil Energy Fuel Cell Program
$65M FY 06 Lower Congressional Mark

Solid State Energy Conversion Alliance - SECA
SECA: A Path to Making Fuels Cells a Reality

2005
- 1st Generation Prototypes
  - Testing & Evaluation

2010
- $400/kW Modules
  - Residential, Commercial, Industrial CHP
  - Transportation APUs

2012 - 2015
- FutureGen - SECA fuel cells available

2020
- MW-Scale SECA fuel cells for Advanced Coal Power Plants
Key Roadmap Milestones
(SECA - SECA/Fuel Cell Coal-Based Systems – FutureGen – Central Generation)

- 2005 – Phase I SECA prototypes
- 2005 – Select Fuel Cell Coal-Based System Teams
- 2008 – SECA Phase II prototype testing
- 2008 -- Modular fuel cell stack test on coal gas
- 2010 – Phase III SECA $400/kW modules
- 2010 – MW-class (250-kW) aggregated, $400/kW fuel cell module test on coal gas
- 2012-2015 – MW-class scaleable fuel cell or fuel cell /hybrid on coal at 50% HHV efficiency at FutureGen
- 2018-2020 – Test MW-class hybrid system on coal at 60% efficiency
- 2020 – 100 MW-class fuel cell systems
## Current Priorities: SECA Core Technology Program

| 1 | Gas seals | - Glass and compressive seals  
|   |           | - Compliant Seals  
|   |           | - Self-healing materials  
|   |           | - High Temperature Seal  
|   |           | - Brazes  
| 1 | Interconnect | - Modifying composition of alloys  
|   |           | - Coatings  
|   |           | - Electrode to interconnect interface contact material  
| 1 | Failure Analysis | - Models with electrochemistry  
|   |           | - Structural characterization  
|   |           | - Structural failure analysis & design criteria  
| 2 | Cathode performance | - Micro structure optimization  
|   |           | - Mixed conduction  
|   |           | - Interface modification  
|   |           | - Electrocatalysts  
|   |           | - Mechanism  
|   |           | - Cathode Task Force  
| 2 | Anode / fuel processing | - Catalyst surface modification  
|   |           | - Characterize thermodynamics/kinetics  
|   |           | - Multi-component catalysts  
| 3 | Materials cost | - Lower cost precursor processing  

SECA Projects, Workshops & Working Groups

• 74 Active SECA Projects
  – SECA Industry
  – SECA Core Program
  – Advanced Research
  – Small Business Innovative Research
  – University Coal Research

• Twelve Public and Core Technology Workshops

• Five Working Groups
  – Seals (Sandia 2004)
  – Interconnects/Chrome (PNNL 2005)
  – Fuel Processing
  – Electrodes (January 2006)
For More Information on SECA and other Projects Visit www.netl.doe.gov/dg

• CDs available from the website
  • FE Fuel Cell Program Annual Report
  • Annual SECA Workshop Proceedings
  • SECA Core Technology Program Peer Reviews
  • Fuel Cell Handbook (7th ed.)
Solid State Energy Conversion Alliance (SECA)

Origin of SECA
The Solid State Energy Conversion Alliance (SECA) was initiated in the fall of 1999 as a unique alliance between government, industry, and the scientific community. SECA promotes the development of environmentally friendly solid oxide fuel cells (SOFC) using commonly available fossil fuels thereby making it an affordable, clean and reliable source of electric power for virtually all markets.

SECA Coordination
The SECA program is carried out under the auspices of the DOE Office of Fossil Energy. The DOE National Energy Technology Laboratory (NETL) and the Pacific Northwest National Laboratory are responsible for program development. NETL is the DOE program office responsible for managing program implementation and NETL’s Strategic Center for Natural Gas coordinate activities with commercial developers, universities, government agencies and other national laboratories who are participants. The Alliance is tightly coordinated so that commercially cost-effective solid oxide fuel cell prototypes for diverse applications are produced and environmental concerns associated with current methods of generating electricity from fossil fuels are mitigated.

http://www.seca.doe.gov/
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Congratulations

GE Completes SECA Phase I

Prototype met SECA Phase I targets:
- Cost: $746/kW ($800/kW)
- Efficiency: 38.0% LHV-AC (35%)
- Degradation: <2%/1000 hours (<4%/1000 hours)
Congratulations

Dr. Mark Williams Elected Fellow of The Electrochemical Society

2005 Class of ECS Fellows

In recognition of contributions to the advancement of science and technology, for leadership in electrochemical and solid-state science and technology, and for active participation in the affairs of The Electrochemical Society.
Special Thanks!

Colorado Fuel Cell Center

Ruthie Coors Swartzlander

Dr. John K. Coors

Mr. Rick Grice