Solid State Energy Conversion Alliance Core Technology Workshop & Peer Review

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Golden, CO
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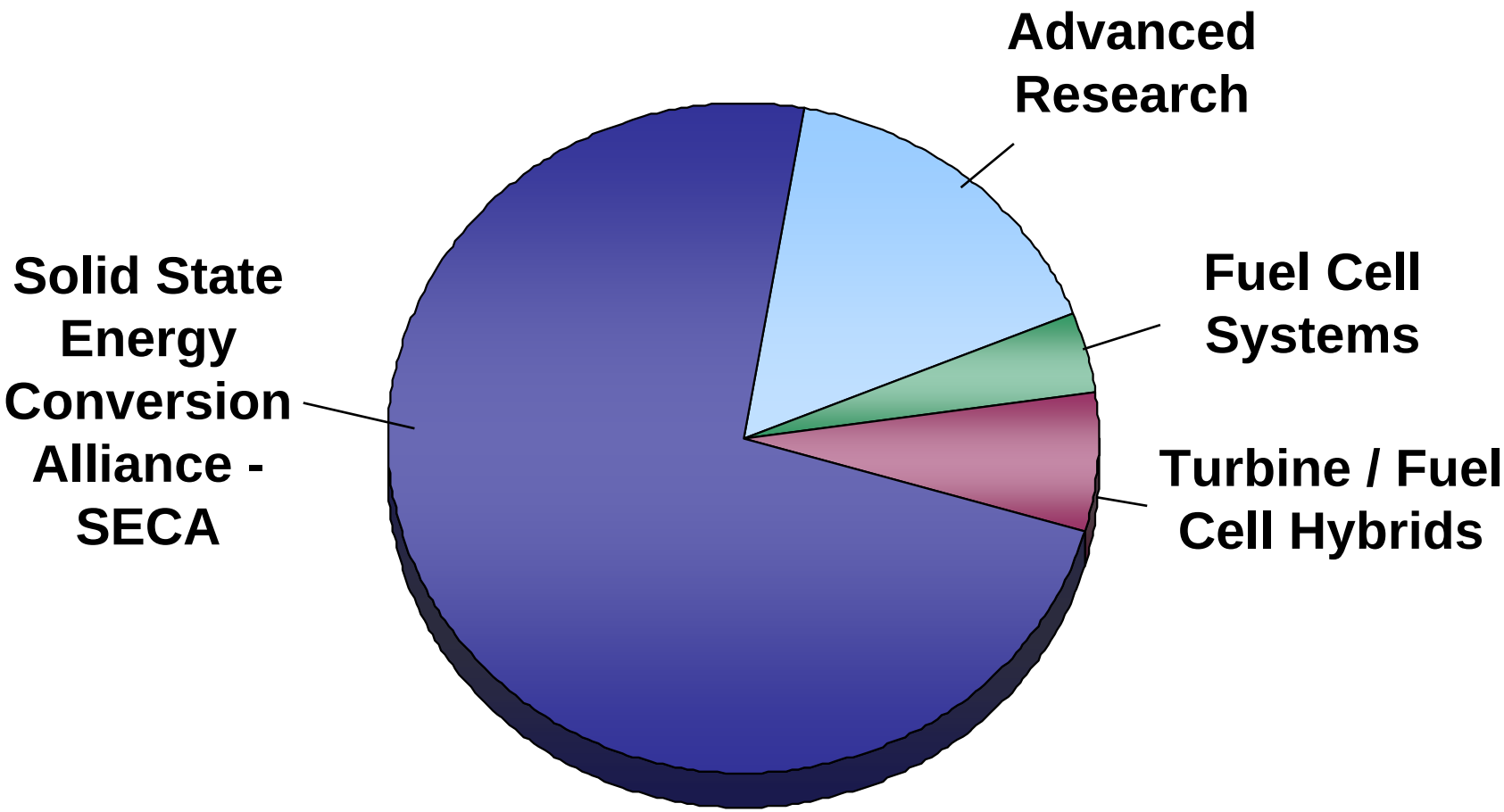
U. S. Department of Energy
National Energy Technology Laboratory

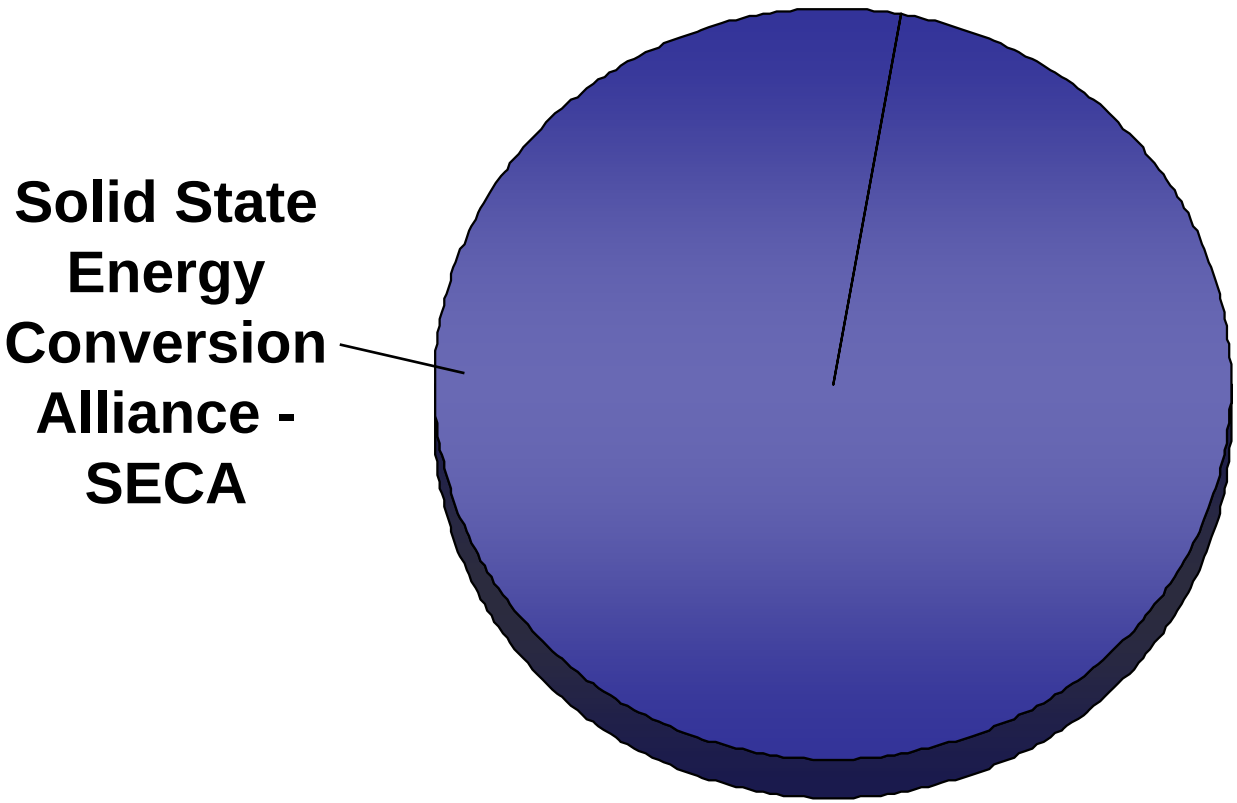
Office of Fossil Energy Fuel Cell Program

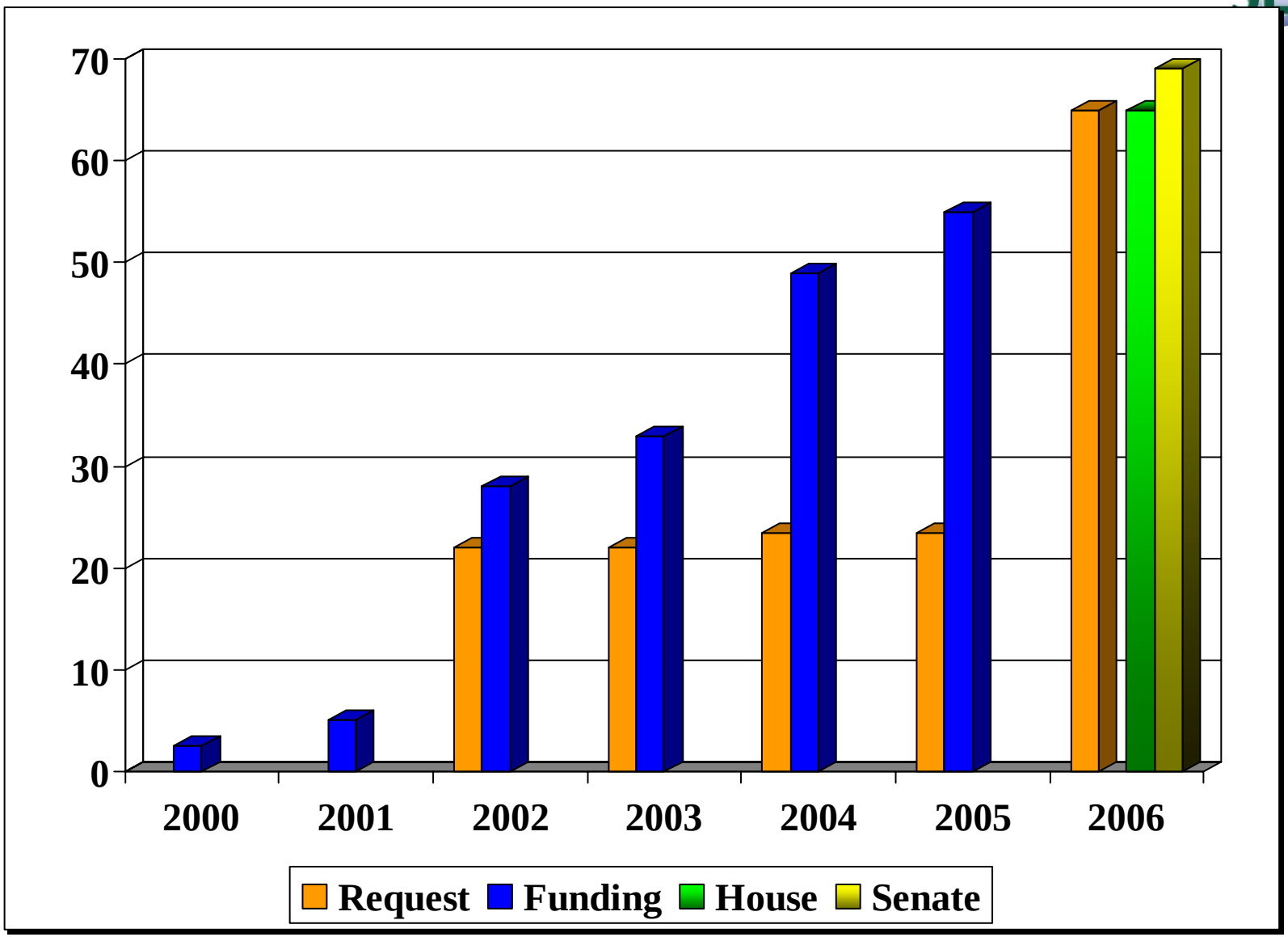
$78.2.1M FY 05 Funding



Office of Fossil Energy Fuel Cell Program

$65M FY 06 Lower Congressional Mark




70
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2000
2001
2002
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Request
Funding
House
Senate

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)

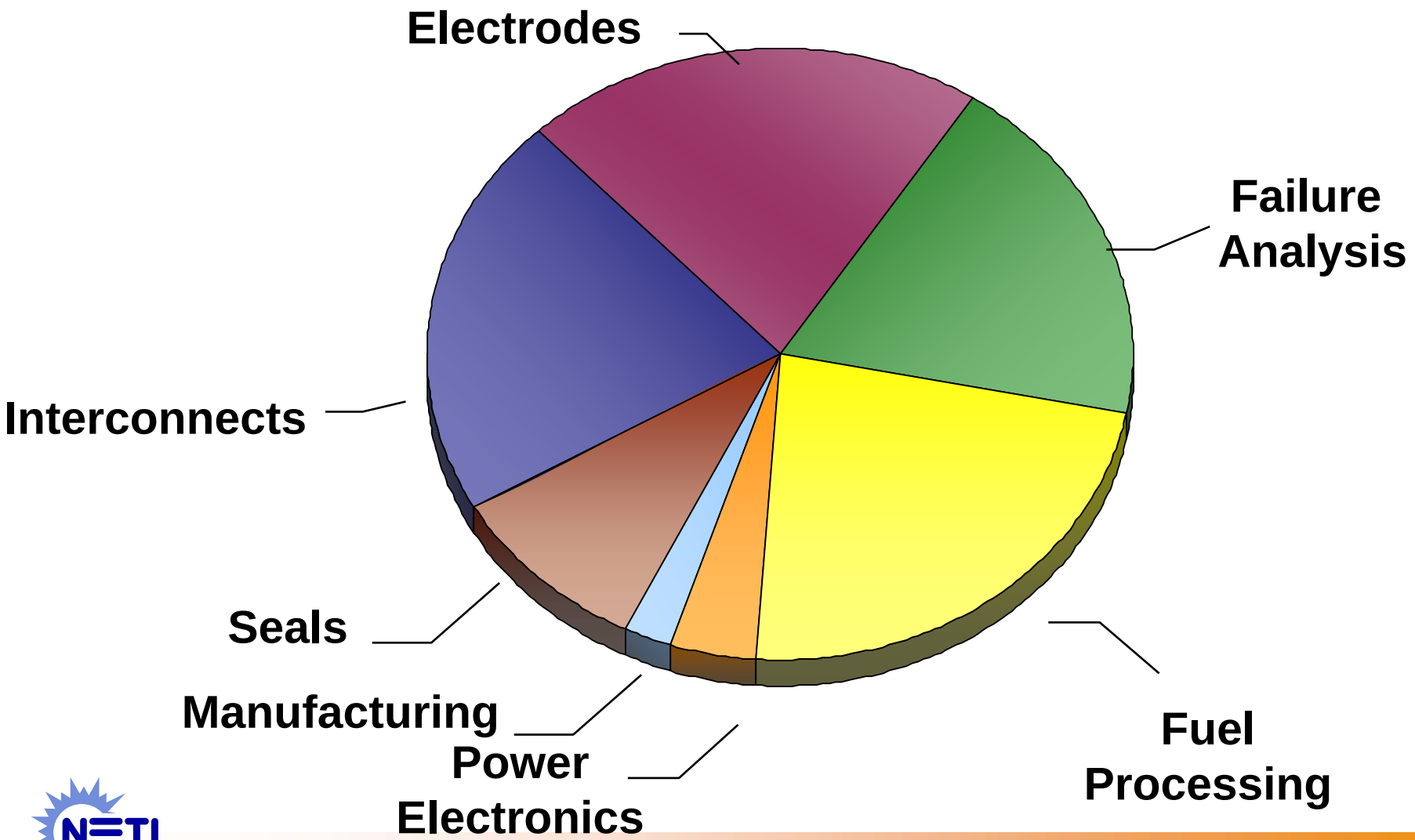
- 2005 – Phase I SECA prototypes
- 2005 – Select Fuel Cell Coal-Based System Teams
- 2008 – SECA Phase II prototype testing
- 2008 -- Modular fuel cell stack test on coal gas
- 2010 – Phase III SECA $400/kW modules
- 2010 – MW-class (250-kW) aggregated, $400/kW fuel cell module test on coal gas
- 2012-2015 – 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 Core Technology Portfolio

$16.3M FY 05 Funding

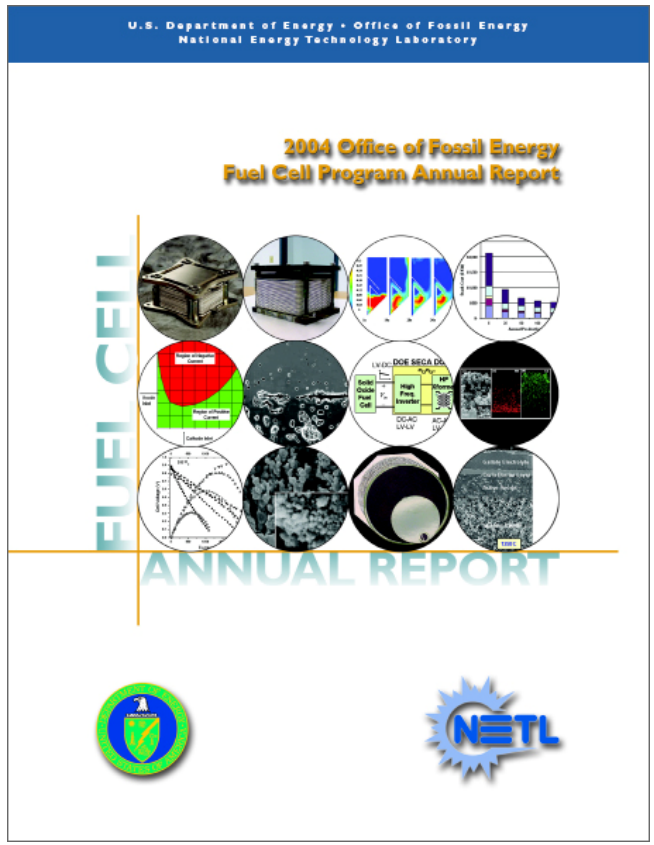


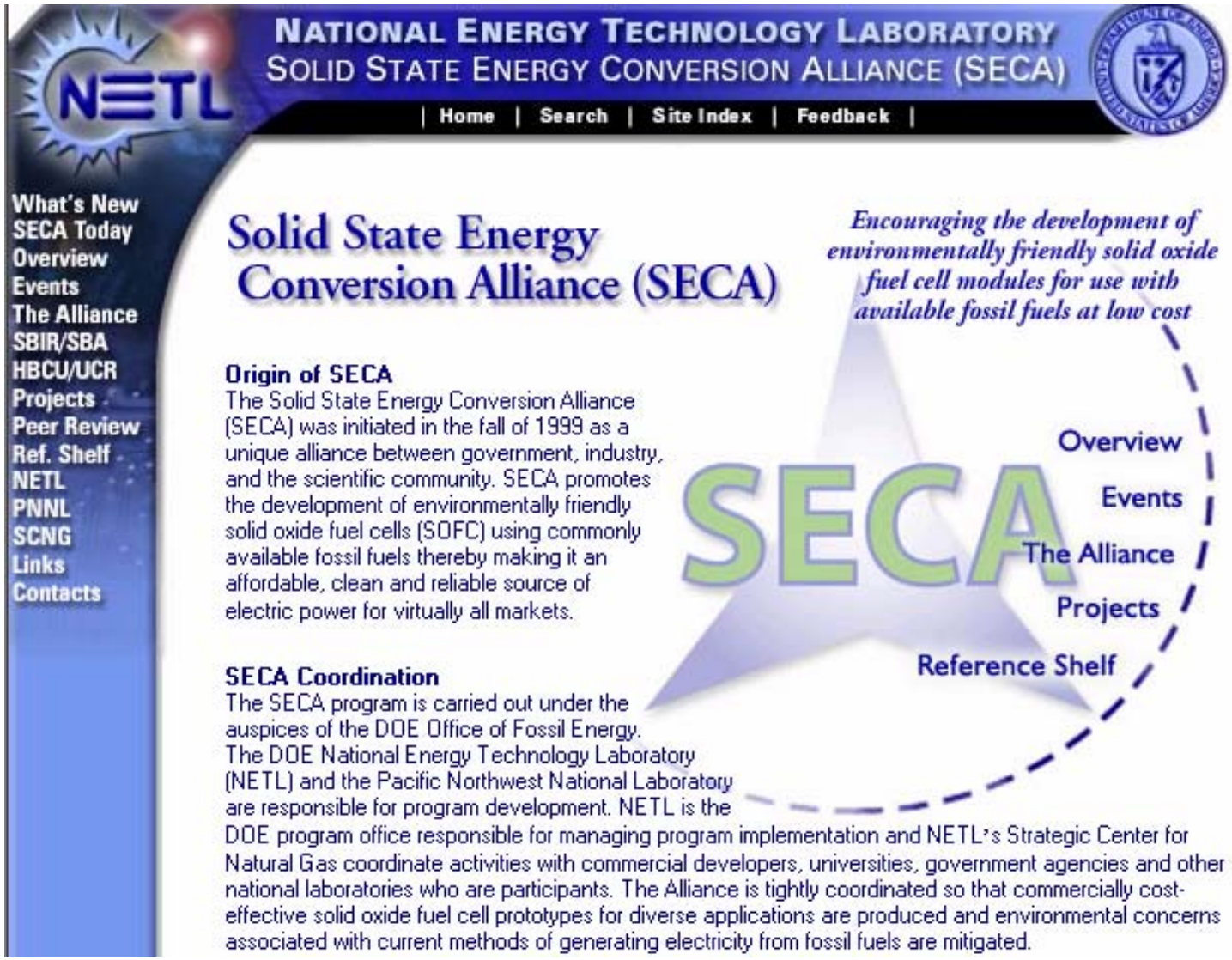
SECA Projects, Workshops & Working Groups

- **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
  - (Army Research Lab 2002 & Pittsburgh, December 2005)
  - 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.)**





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

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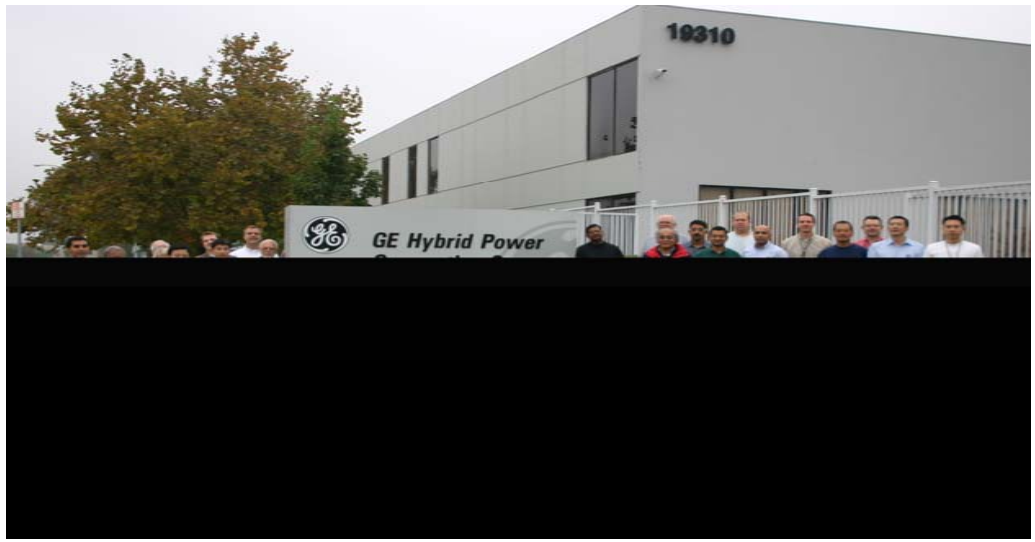
Congratulations

GE Completes SECA Phase I

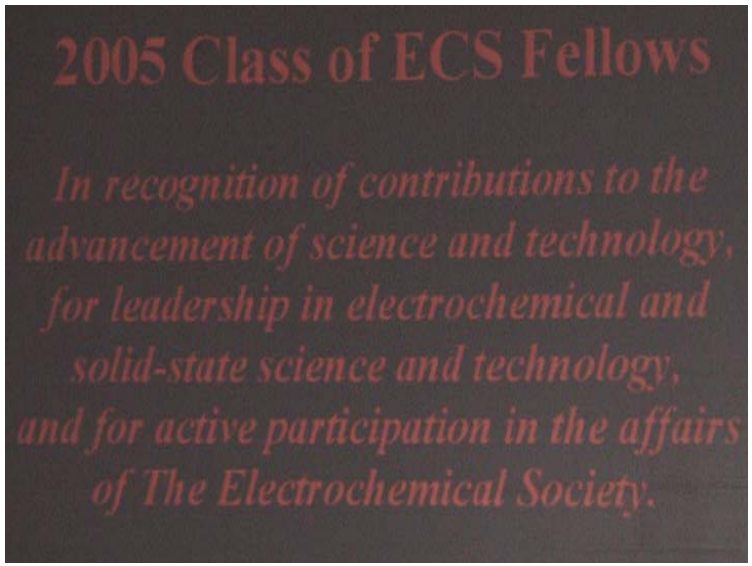


Prototype met SECA Phase I targets:

- 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



Special Thanks!

Colorado Fuel Cell Center

Ruthie Coors Swartzlander

Dr. John K. Coors

Mr. Rick Grice