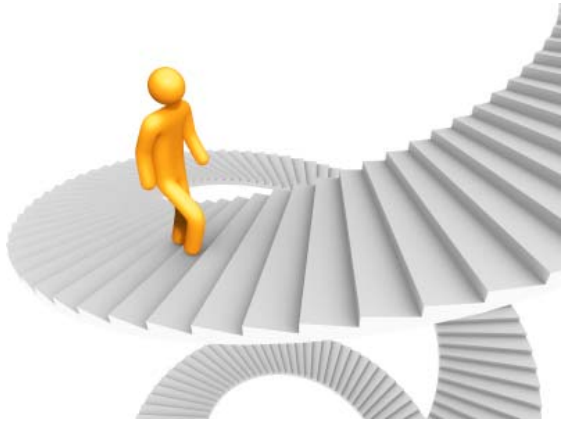
Fuel Cell Council Working Group on Aircraft and Aircraft Ground Support Fuel Cell Applications

Topics

- The US Fuel Cell Council
- Aircraft and Aircraft Support Working Group Establishment
- Working Group Members
- Mission Statement
- Focus moving forward

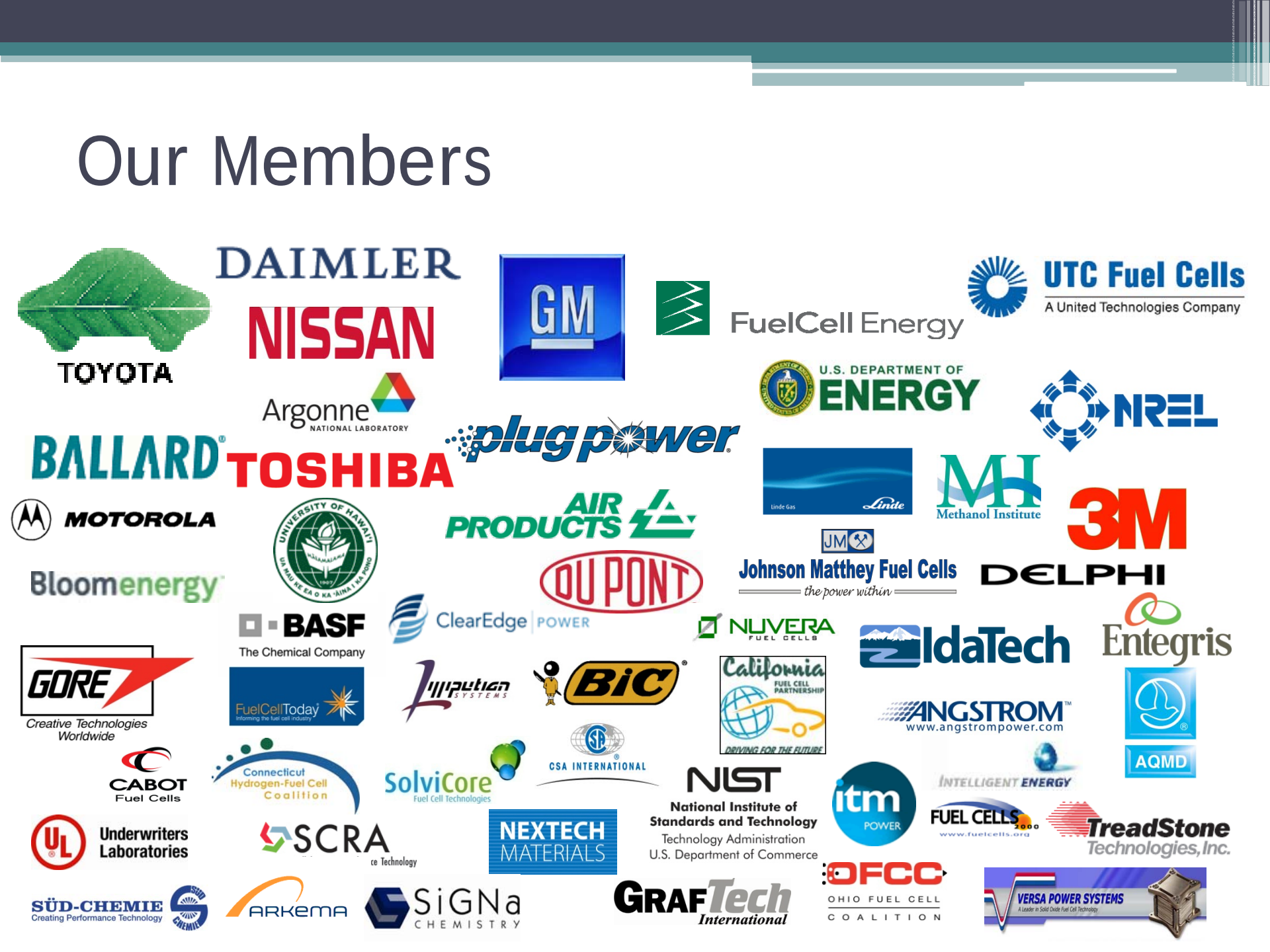


The US Fuel Cell Council

US Fuel Cell Council

- Trade Association for the industry since 1998
- Member driven - Market focused
- Developers, suppliers, customers, nonprofits, government
- Advocacy
- Regulations
- Safety and standardization
- Education
- Strategic Alliances

Our Members


TOYOTA
DAIMLER
NISSAN
GM
FuelCell Energy
UTC Fuel Cells
A United Technologies Company
Argonne
NATIONAL LABORATORY
U.S. DEPARTMENT OF
ENERGY
NREL
BALLARD
TOSHIBA
plug power
Linde Gas
Linde
Methanol Institute
3M
MOTOROLA
AIR
PRODUCTS
JM
Johnson Matthey Fuel Cells
the power within
DELPHI
Bloomenergy
DU PONT
BASF
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ClearEdge POWER
NUVERA
FUEL CELLS
IdaTech
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Fuel Cell Technologies
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Standards and Technology
Technology Administration
U.S. Department of Commerce
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itm
POWER
FUEL CELLS 2000
www.fuelcells.org
TreadStone
Technologies, Inc.
UL
Underwriters
Laboratories
SCRA
ce Technology
NEXTECH
MATERIALS
SÜD-CHEMIE
Creating Performance Technology
ARKEMA
SiGNa
CHEMISTRY
GRAFTech
International
OFCC
OHIO FUEL CELL
COALITION
VERSA POWER SYSTEMS
A Leader in Solid Oxide Fuel Cell Technology

USFCC Working Groups

- Government Affairs
- Codes & Standards
- Education & Marketing
- Materials and Components
- Transportation
- Power Generation
- Portable Power
- Solid Oxide Fuel Cells
- Aircraft and Aircaft Support
  - Aerospace or Aeronautical? That is the question.

USFCC Task Force & Focus Groups

- Gaskets
- Cargo Transportation (UN and ICAO)
- Portable Transportation (UN and ICAO)
  - Strategic Alliance with IATA
- Advanced Hydrogen Storage Materials Codes & Standards

Regulatory Affairs

- Facilitate international open markets
- Develop safety standards, performance standards
- Interface with regulatory authorities
  - United Nations Subcommittee of Experts on the Transport of Dangerous Goods
  - International Civil Aviation Organization
  - International Air Transport Association
  - USDOT and other transport authorities
  - FAA and other CAA

Regulatory Successes

- Leading an international effort to
  - integrate fuel cells, fuel cell vehicles and fuel cell engines into international transport regulations: air, sea, road and rail
  - allow passengers carry-on and use of fuel cells and fuel cell cartridges on passenger aircraft
  - provide for routine shipment of hydrogen stored in metal hydrides
- Leadership role in national and international committees, working groups, and task forces

Standardization Successes

- Members and staff participate in national and international standards efforts: ISO, IEC, NFPA, ASME, CSA, UL, IEEE, and others
- Published technical papers on PEM and SOFC
- Nomenclature, costing, performance, commercial status definition
- International round-robin testing

Aerospace (or Aeronautical) Working Group Established

- The USFCC Aerospace Fuel Cell Working Group will provide a forum for pre-competitive information sharing and interaction amongst interested industry stakeholders…

Aerospace (or Aeronautical) Working Group Established

- Members include experts from Boeing, Cessna, Airbus, Bell Helicopter, Sikorsky, NASA and others.
- These are interested experts, sharing their individual expertise, similar to SAE working group structures. There are no formal corporate ties.
- All are welcome to participate.

Aero Working Group

- Explore aircraft primary power and auxiliary power needs.
- Fixed wing, rotorcraft, high altitude, manned and unmanned

Aero Working Group

- Explore ground support needs
- Airport infrastructure
- Mobile refueling
- Tugs and general maintenance equipment
- Back-up power
- Sustained electrical power quality

Aero Working Group

- Explore fuel cell state-of-the-art
- Energy and power density
- Full-system approach
- Reformer technologies
- De-sulfurizing technologies
- Hydrogen storage
- Power electronics

Investigate Fuel Cell State-of-the-Art

- NASA (DOD) Technology Readiness Level (TRL) evaluation
- Develop methodology for assessing emission reductions and petroleum usage reductions
- Perform comparisons

Investigate Fuel Cell State-of-the-Art

- Investigate replacement fuels
- Look at competing technologies
  - Turbine APUs and main engines
  - Batteries
  - Ram Air Turbines
  - Hydrogen IC engines
  - Super capacitors
  - Diesel
  - Solar

Aero Working Group

- Future Meeting Topics
  - Aircraft applications and needs
    - Fixed wing and rotorcraft
  - DOD applications
  - Previous NASA work
  - Fuel cell state-of-the-art
  - DOE Laboratory capabilities and research
- Next meeting – October 5, 2010, 10:00 AM US Eastern Time [16:00 PM Central European Time]

Euro CAE Working Group 80

- The European Organisation for Civil Aviation Equipment *L'Organisation Européenne pour l'Equipement de l'Aviation Civile*
- Euro CAE Working Group 80 was established in October 2008 "To develop guidelines to support qualification and certification of Hydrogen Fuel Cell Systems in the various intended applications for civil aircraft".
- Working as a joint group with SAE AE7 "to develop guidelines to support the use of Hydrogen (and Oxygen) Fuel Cell Systems for a given performance for aircraft applications".

Euro CAE Working Group 80

- Chairman: Hans Dieter Hansen, Airbus
- Secretary: Chris Ford, QinetiQ

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