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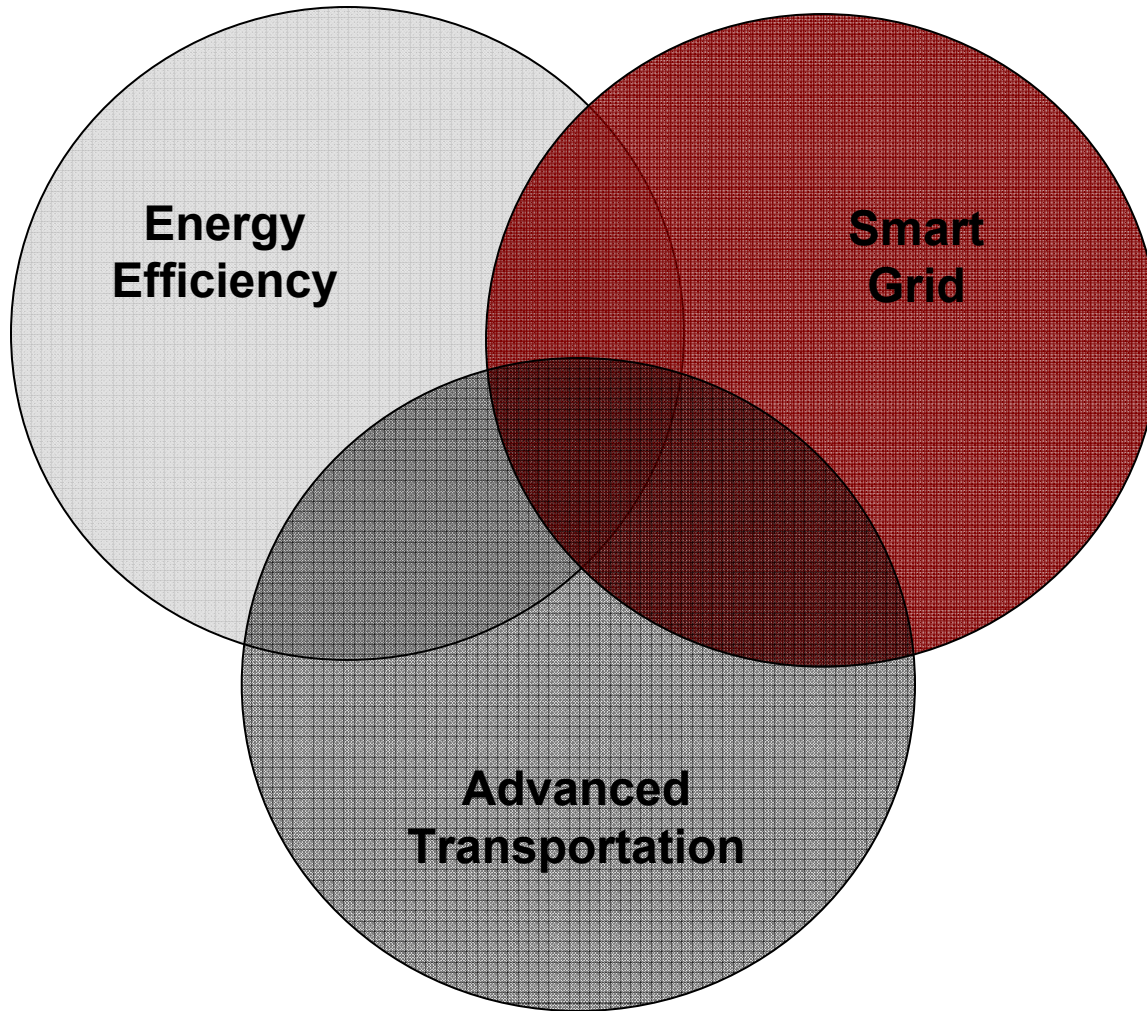


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▶ Technology Assessment

- ▶ Is it technically feasible?
- ▶ Does it work in real applications?
- ▶ Can it work with other technologies?
- ▶ Does it have value to utilities or consumers?
- ▶ Does it demonstrate advanced services and products?

▶ Cross section of needs



▶ Energy Efficiency/Demand Response

- ▶ Measures that can be affected by real-time communications (prices and reliability)
- ▶ Direct load control (HVAC, water heating, etc.)
- ▶ Smart load control in response to price signals
- ▶ Distributed generation (solar, fuel cells, CHP)
- ▶ Curtailable load for manufacturing
- ▶ Energy storage (thermal and electric)

▶ Smart Grid

- ▶ End-to-end real-time communications
- ▶ Prices to devices
- ▶ Open architecture; standard protocols
- ▶ Plug and play connectivity
- ▶ Self diagnostics and self healing
- ▶ AMI

▶ Advanced Transportation

- ▶ Plug-in hybrid electric vehicles (PHEVs)
- ▶ Charging station monitoring and control
- ▶ Carbon impacts
- ▶ Grid connectivity with communications
- ▶ Multiple platforms (passenger, light-duty and heavy duty)

▶ Variable Speed Pool Pumps

▶ Estimated savings from converting pumps for approximately 5,000,000 in-ground pools to variable speed.

- National
 - 8,434 MW peak demand
 - 9,466 GWh annually
- Per Unit
 - 1.54 kW¹
 - 2,000 kWh annually¹

> 1.9 million tons of coal avoided annually²

> 7.2 million tons of CO² avoided annually²



Sanford, NC

¹ Calculated by utility using DEER methodology

² Calculated using national average fuel mix 62% coal

▶ Incentive Programs

- ▶ Variable speed pool pump incentive programs
 - > SCE*
 - > PG&E*
 - > SDG&E
 - > Various CA Municipalities
 - > Austin Energy
 - > Nevada Power*

* Offer third-party outsourced programs



▶ Hybrid Plug-In Electric School Buses

▶ Facts

- > Initiated by Advanced Energy in 2002
- > The most viable plug-in platform to commercialize at the time
- > Available for purchase today
- > Built by International Corporation
- > Lifecycle savings expected in full production volumes
- > U.S. EPA helped many districts with Clean School Bus USA funds



▶ Nationwide plug-in deployment

Delivered

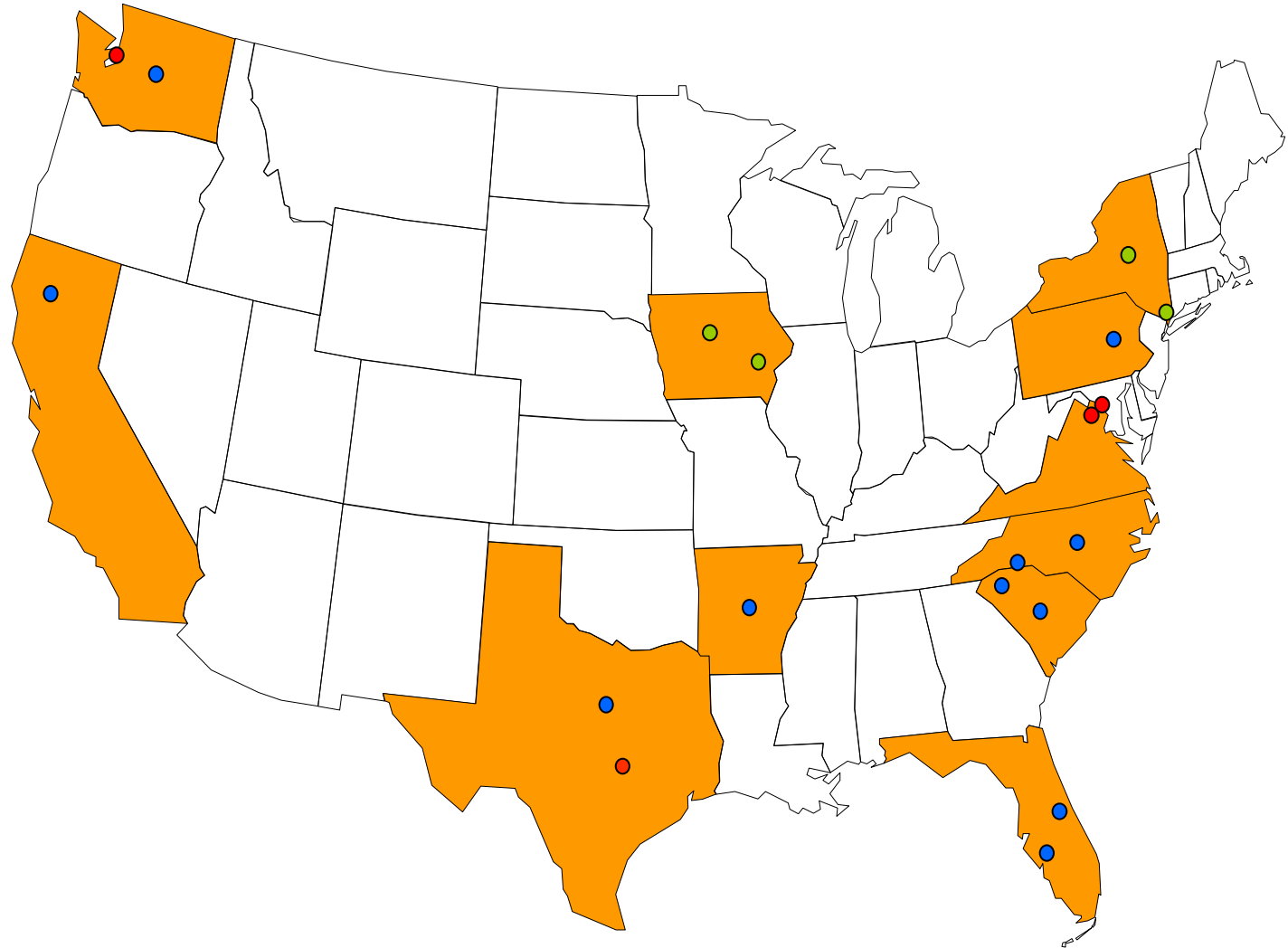
- ▶ Arkansas (1)
- ▶ California (1)
- ▶ Florida (2)
- ▶ North Carolina (2)
- ▶ Pennsylvania (1)
- ▶ South Carolina (2)
- ▶ Texas (1)
- ▶ Washington (1)

Funded / Ordered

- ▶ Iowa (2)
- ▶ New York (2)

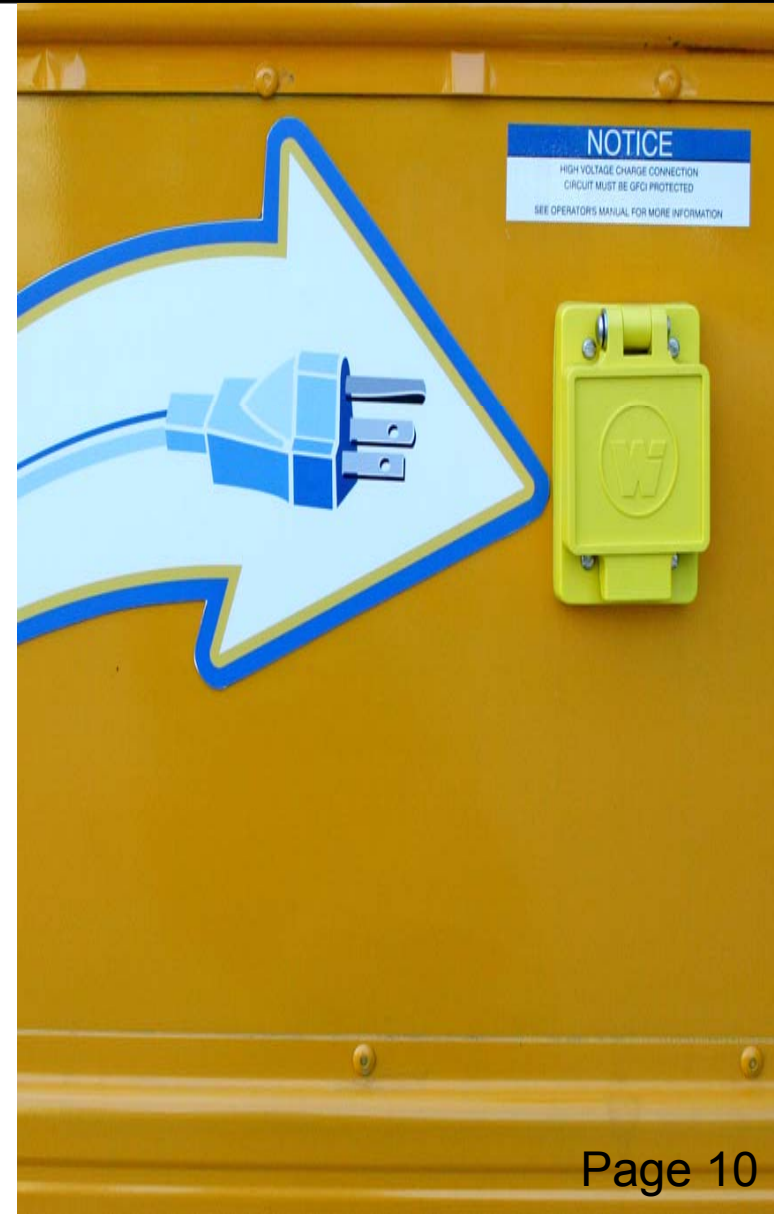
Pending

- ▶ Texas (1)
- ▶ Virginia (1)
- ▶ Washington (1)
- ▶ Washington DC (1)



▶ Hybrid Plug-In Electric School Buses

- ▶ 50-100% estimated improvement in fuel economy
- ▶ ~30% carbon reduction when recharged with normal power generation



▶ Solar Energy – MegaWatt Solar

- ▶ Concentrating
- ▶ Two axis tracking
- ▶ Based in Hillsborough, N.C.
- ▶ Motto
 - > "Solar without subsidies"
- ▶ Production costs significantly lower than existing solar
- ▶ 3.5 kW test unit operating



Current “Plate & Frame” Technology Fuel Cell Stack

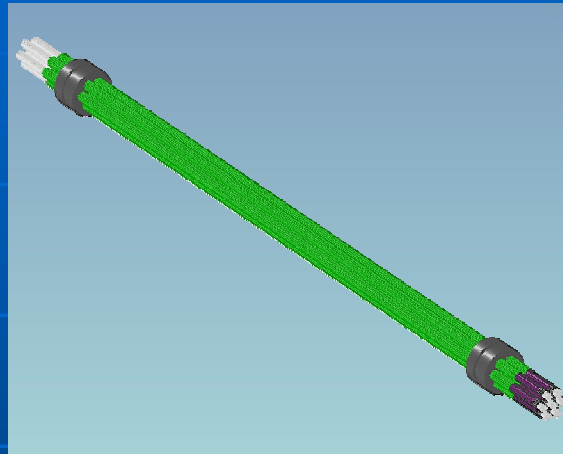


How is Microcell's fuel cell
different?

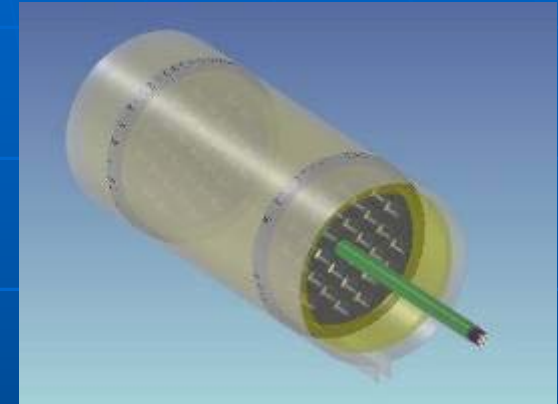
Technology – Microcell Assembly



- 1-1.5 Watts per cell
- Mass produced on high speed extrusion line



- Replaceable Unicell (10-15W)
- Fuel, air and thermal management incorporated
- Inserted into module and sealed
- About the size of a pencil



- Building block for larger systems (25 or 50kW)
- Currently 1-2kW module is 4" in diameter and contains 120 Unicells
- Separate chambers to feed fuel, air and coolant
- End caps contain "quick connect" electrical connections

Significant Competitive Advantages

Lower Production Cost

- Continuous automated extrusion process
- Derived from raw materials compared to purchasing components
- Elimination of expensive bipolar flow field plates
- Reduced auxiliary and control equipment requirements; no humidification equipment
- Simplified design and fabrication processes = lower labor costs

High Power Density

- Simplified design and no humidification system = compact and lightweight
- Cylindrical shape provides the ideal fibrous geometry, resulting in the highest possible surface area / volume ratio
- Power density results exceed 1kW/L

Ease of Repair, Serviceability

- Individual Microcell cores are inserted into a fuel cell module
- Individual cores can be replaced without replacing the entire module

High Thermal Efficiency

- Heat removal occurs from every inch of every single cell
- Design allows for optimal heat removal to reduce cell degradation

Quick Start Operation

- Metallic current collectors heat up much faster than graphite plates
- Reach operating temperature quickly; essential for operating effectively in cold weather conditions



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