



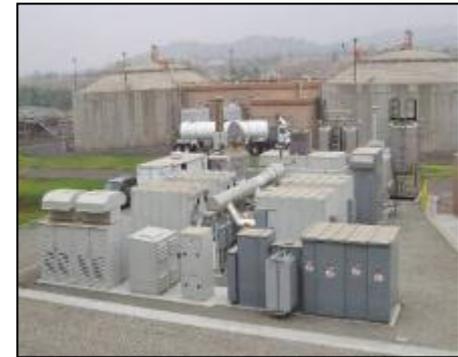
FuelCell Energy

## Fuel Cells and Renewable Portfolio Standards

Webinar hosted by the Clean Energy States Alliance, the US Department of Energy, and the Technology Transition Corporation

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Ultra-Clean, Efficient, Reliable Power



- FuelCell Energy (FCE)
- The Benefits of Fuel Cells
- Considerations for a Comprehensive Clean Energy Portfolio
- Q&A





## **Worlds Leading Manufacturer and Operator of Fuel Cell Systems**

Founded 1969, Public Offering 1992

Global Client Base, Strong Global Partners

Strong Support of Institutional/Mutual Fund Holders

Component of Six Financial Indexes

## **Corporate Office, Research & Engineering**

Research and Design Center

Global Operations and Service Center

450 Total Employees

## **Manufacturing**

Cell Production, Module Assembly

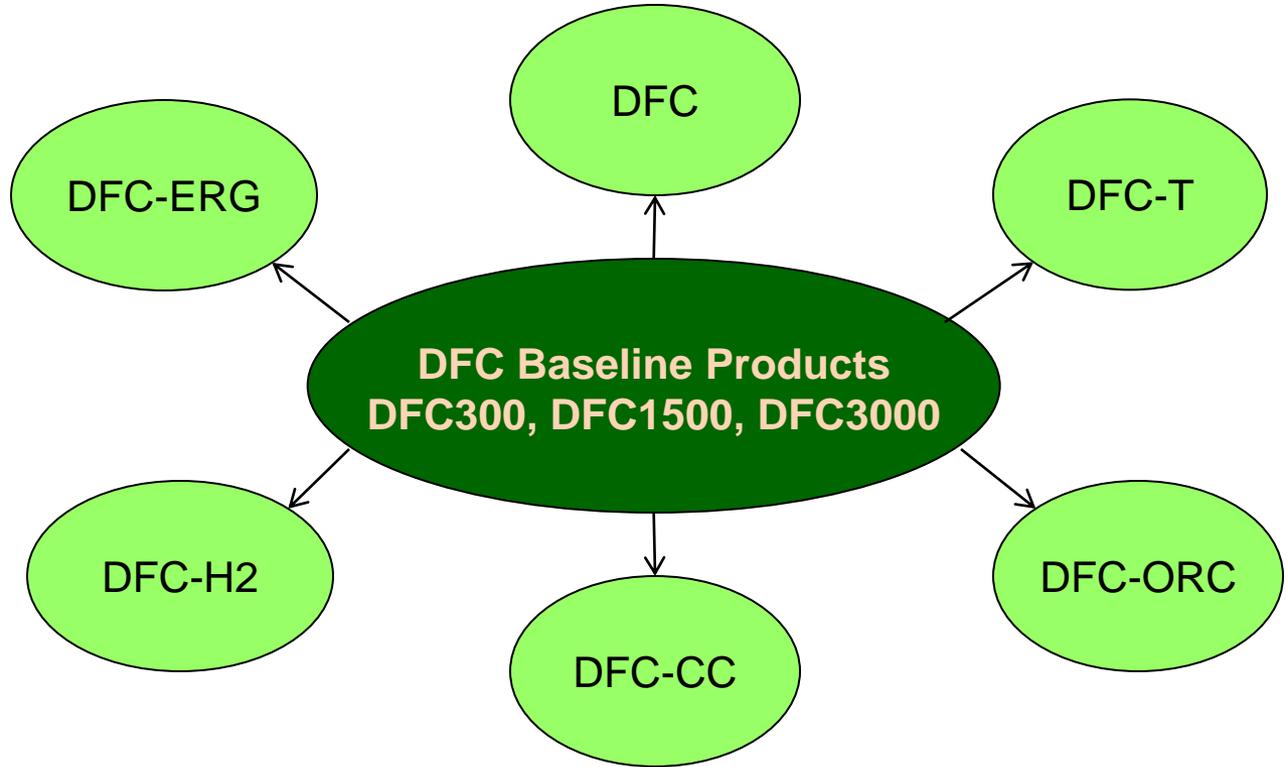
65,000 ft<sup>2</sup> Facility, Opened in 2001

90 MW Capacity, Expandable to 150 MW





# Fuel Cells – A Technology Platform



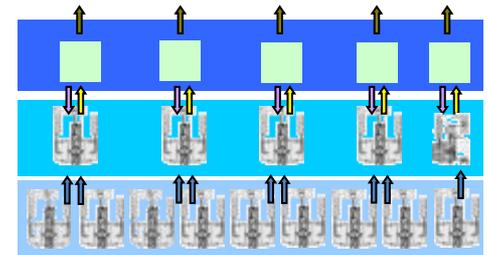
DFC-ERG



DFC-ERG



DFC-H2



DFC-CC



## *Fuel Cell Benefits to a Portfolio*

- Ultra-clean, efficient and reliable power
  - > Continuous and secure baseload power
  - > Complements intermittent wind and solar
  - > Does not require transmission grid
- Near-zero NO<sub>x</sub>, SO<sub>x</sub> and particulate matter emissions
  - > Allows siting in congested/urban areas
- Higher electrical efficiency than competing technologies
  - > 47% to 70% electrical efficiency, up to 90% with combined heat & power (CHP)
  - > Efficiency drives economics
- Distributed generation - power where needed
  - > Enables smart grid



1.4 MW power plant



2.8 MW power plant



11.2 MW power plant



- Operation on Renewable Fuels – Multiple Benefits
- DFC plants convert waste problems into ultra-clean power



End market:	Wastewater	Food & Beverage	Agriculture	Landfill Gas
Applications:	Municipal water treatment facilities	Food processing and breweries	Ranches & farms using animal and plant waste	Landfills
Key attributes:	Emissions, Sustainability, Reliability, Support RPS	Waste disposal solution, Sustainability, Energy security	Waste disposal solution, Sustainability, Energy security	Waste disposal solution, Emissions, Supports RPS



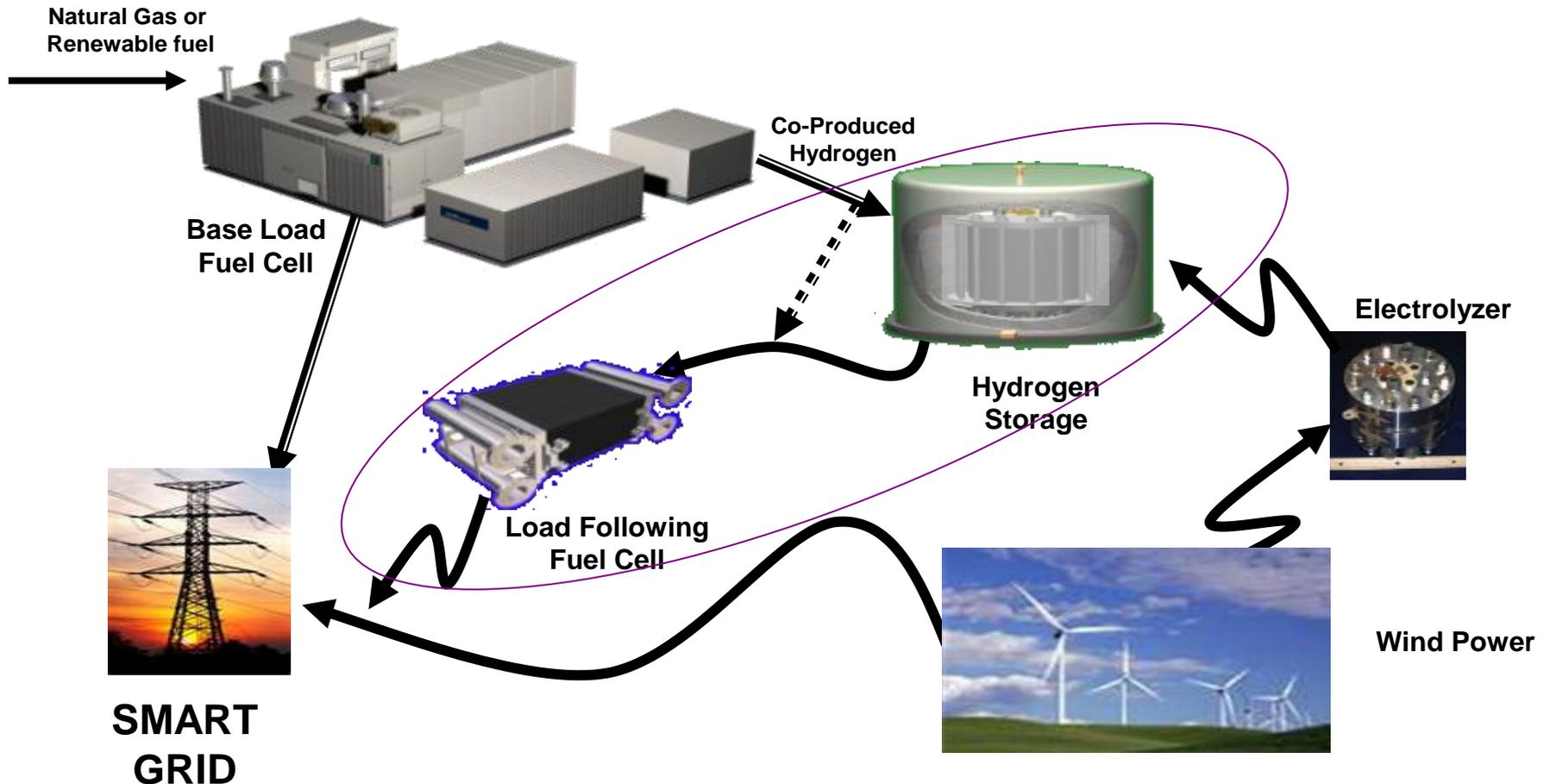
- **RPS' are progressive policy:** Evolution and Improvement are essential to achieve political, environmental, economic and technology goals.
- **Traditional Renewable Technologies do not always meet the multiple RPS goals.** Renewable is not always clean, or practical in localized applications.
- **We are becoming more electric intensive:** Renewable energy, efficient of production electricity and grid factors will be more intertwined.



- **Among the spectrum of technologies available to an RPS, fuel cells on natural gas offer compelling attributes:**
  - Lower cost and predictable energy delivery
  - Contributes to lowering total carbon and carbon separation
  - Distributed generation benefits not available at the bulk or wholesale level
  - Federal Tax Treatment that leverages precious State monies
  - Generation that is cleaner than biofuel or biomass combustion



## DFC-H2<sup>®</sup> Peaker - Compliments Smart Grid





- Korean Model of New and Renewable Portfolio Standard
  - Recognizes the mix of national economic and renewable energy desires
  - Fuel cells on Natural Gas (LNG) are included
  - Base market RPS rate plus a technology multiplier
  - Similar features in Federal Clean Energy Standard proposed legislation
- Floor Price for all technologies with Additional Price Components for specific economic or environmental attributes
  - A Cents/kwh for Economic Content
  - B Cents/kwh for Zero Emissions
  - C Cents/kwh for Low Emissions (California CARB 2007 Standards)
  - D Cents/kwh for power provided during peak periods
  - E Cents/kwh for Minimum CHP efficiency
  - F Cents/kwh for Other Features (i.e. Brownfields, Economic Zones, State/Public facilities)



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**Thank you for your participation!**

**Questions & Answers**

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