

## Pajarito Powder, LLC: The Team, Customer Engagement & Why We Exist

### Team, Board, and Advisory Team



### Pajarito Powder Differentiation

- Customer responsive
- “Right” scale development and manufacturing
- Modular, flexible, manufacturing platform
- Concentration on the low-cost under-engineered component, not the expensive commodity
- Patents, trade-secrets, and know-how

### Strong Customer Engagement

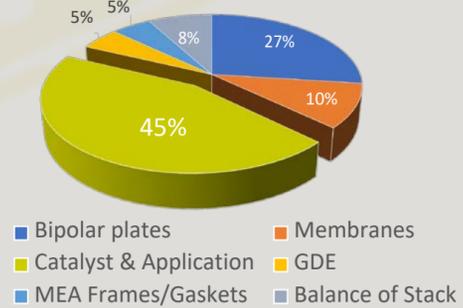


- Working with automotive OEMs
- Product sales accelerating

### Products

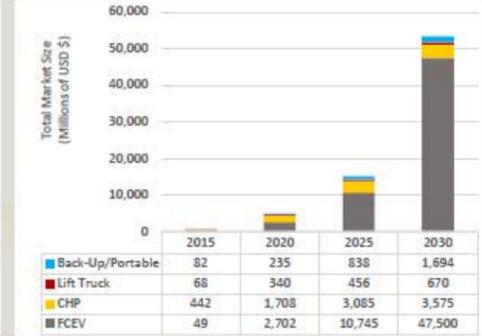
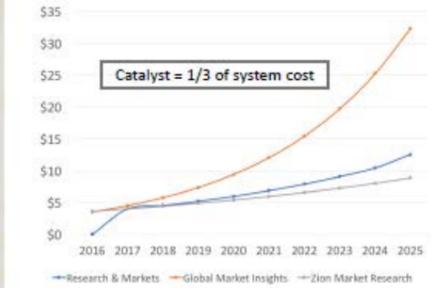
- Fuel Cell and Electrolyzer catalysts
  - Catalyst is the single most expensive component in a fuel cell stack (30%+ of total stack cost)
  - Pajarito Powder products achieve 60% of needed cost reduction (~10\$/kW savings)
- Current Products
  - Engineered Catalyst Support (ECS)
  - Pt/ECS Catalysts
  - Precious-Metal-Free (PMF) Catalysts
  - Electrolyzer Catalysts (In Development)

### Stack Component Costs



## Market: Forecast Growth & Products

### Fuel Cell Industry Forecast (billions \$USD)



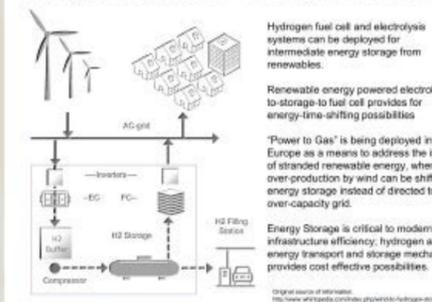
### FC Vehicle & Truck Offering Accelerating



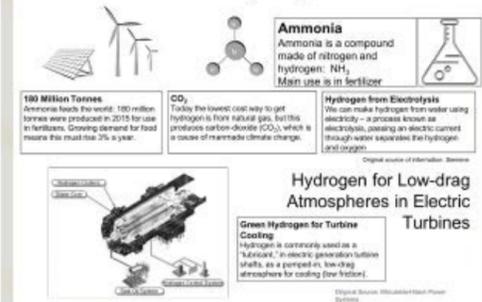
### Fuel Cell Forklifts, CHP and Stationary



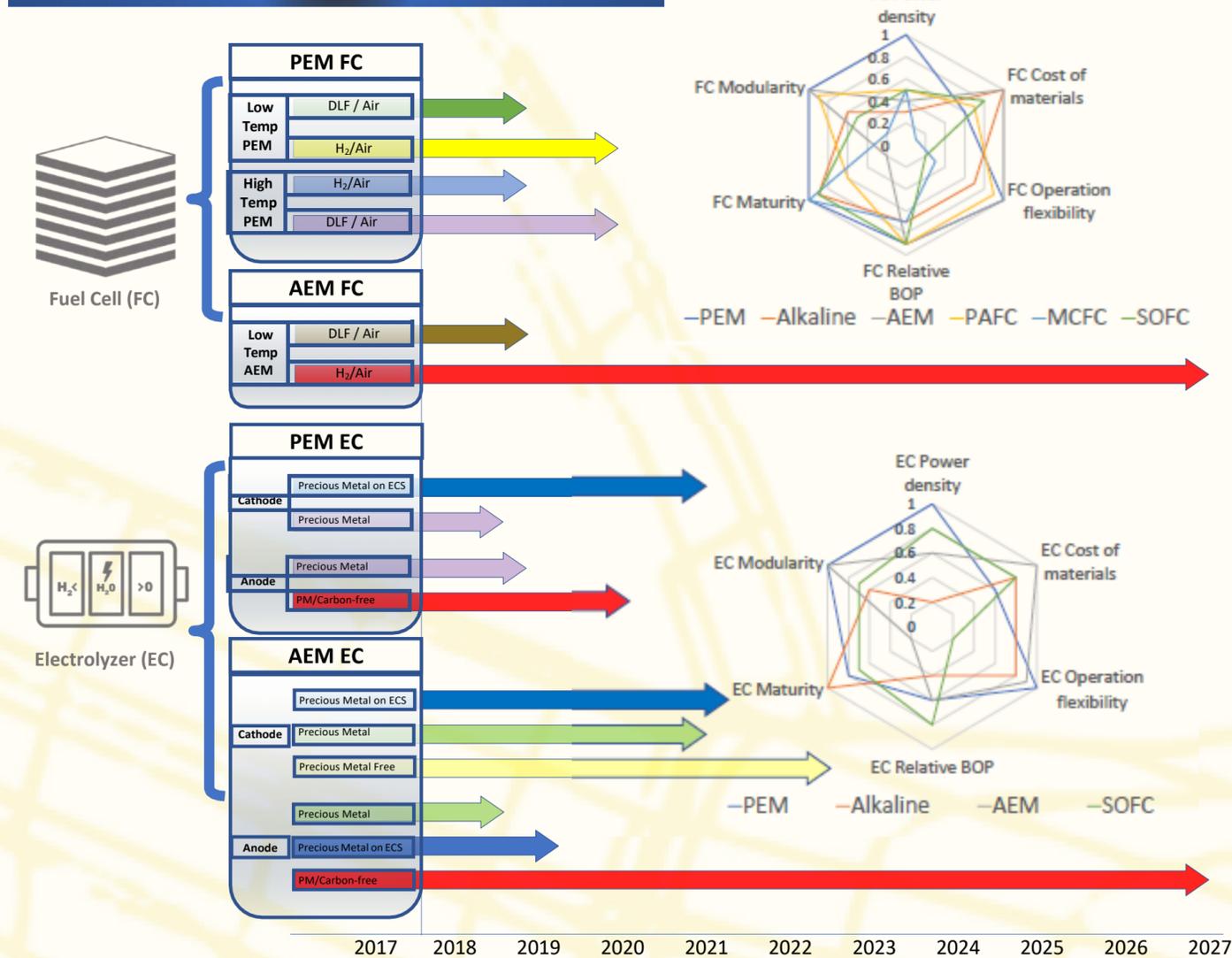
### Grid Applications for FC Using Renewables



### Green Ammonia and Hydrogen for Turbines



## Pajarito Product Development Roadmap



## Precious Metal Free Regenerative Hydrogen Electrode (ARPA-E DE-AR0000688)

Barr Zulevi, Pajarito Powder  
 Kathy Ayers, Proton Onsite  
 Sanjeev Mukerjee, Northeastern University  
 Madeleine Odgaard, EWII (Formerly IRD)  
 Plamen Atanasov, University of New Mexico

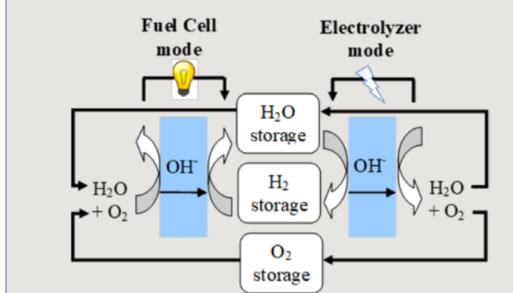
**Vision**

- Develop precious metal free fuel cell and electrolyzer catalysts for low cost energy storage

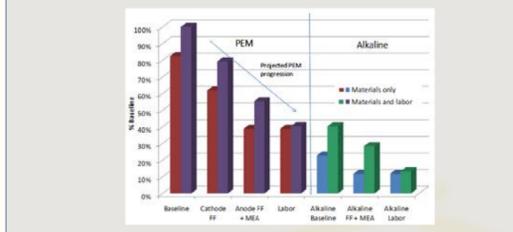
**Impact**

- Enable low cost precious metal free fuel cells and electrolyzers for transportation, backup-power, and renewables grid-level energy storage

### Regenerative Fuel Cell/Electrolyzer



- Innovation**
- Elimination of platinum group metals through use of anion exchange membrane technology for fuel cells and electrolyzer
  - Focus on the bifunctional hydrogen electrode as the critical remaining enabler to low cost materials



### Targets

Metric	S.o.t.A	Proposed
Voltage, 0.35A/cm <sup>2</sup> (fuel cell)	0.4 V	0.65 V
Voltage, 0.5A/cm <sup>2</sup> (electrolyzer)	2.4 V	2.1 V
\$/kW at stack level (AEM vs PEM)	\$400 (PEM)	\$50 (AEM)

Task and lead	Yr 1	Yr 2	Yr 3
FC catalyst: PP, UNM	█	█	█
EC catalyst: NU, Proton, PP	█	█	█
Electrode: Proton, EWII, PP	█	█	█
T2M: PP, Proton, EWII	█	█	█

**Tech-to-Market strategy**  
 Short-term: high-value, fault tolerant electrolyzers, electrodes and catalysts for specialty markets.  
 Long-term: reversible fuel cell and components for renewable storage.