




# Fuel Cell 2.0 - Oorja Delivers

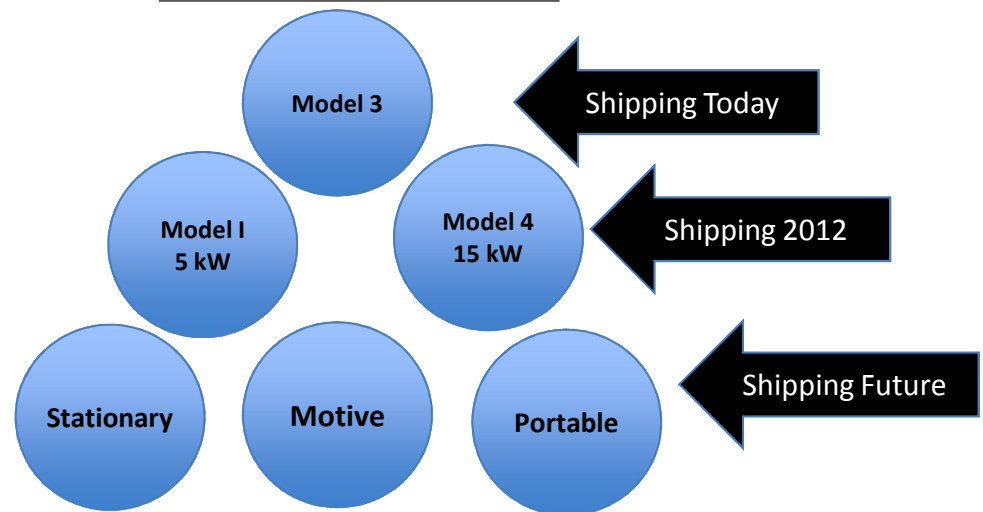
Attribute	Fuel Cell 1.0 had Challenges	Fuel Cell 2.0 Oorja Delivers
<b>Technology:</b>	<ul style="list-style-type: none"> <li>☐ <b>Distribution:</b> no solution</li> <li>☐ <b>Storage:</b> partial solutions</li> <li>☐ <b>Fuel Cells:</b> uneconomical</li> </ul>	<ul style="list-style-type: none"> <li>✓ <b>Distribution:</b> methanol – 15 BG/Y</li> <li>✓ <b>Storage:</b> energy dense liquid</li> <li>✓ <b>Fuel cells:</b> 50x more powerful</li> </ul>
<b>Market:</b>	<ul style="list-style-type: none"> <li>☐ <b>Customers:</b> automotive and consumer electronics</li> <li>☐ <b>Size:</b> large but technology didn't deliver</li> </ul>	<ul style="list-style-type: none"> <li>☐ <b>Customers:</b> repeat commercial volume orders</li> <li>☐ <b>Size:</b> \$5 billion addressable today, going to \$30+ billion with cost reduction</li> </ul>
<b>Economics:</b>	<ul style="list-style-type: none"> <li>☐ <b>Gross margin:</b> negative</li> <li>☐ <b>Fuel Infrastructure:</b> high cost</li> <li>☐ <b>Customer paybacks:</b> multi year</li> </ul>	<ul style="list-style-type: none"> <li>☐ <b>Gross margin:</b> Positive</li> <li>☐ <b>Fuel Infrastructure:</b> low cost</li> <li>☐ <b>Customer paybacks:</b> 12 month</li> </ul>

Product	Year	Description	Advantages
 Model 3	2008	The OorjaPac™ Model 3 is a 1.5kW liquid fuel cell that operates as an on-board battery charger	<ul style="list-style-type: none"> <li>• Refuels in less than 1 minute</li> <li>• Eliminates grid-charging of battery</li> <li>• Prolongs the life of the battery</li> </ul>

Scalable Technology Architecture Delivers Watts to Kilowatts Serving Many Applications



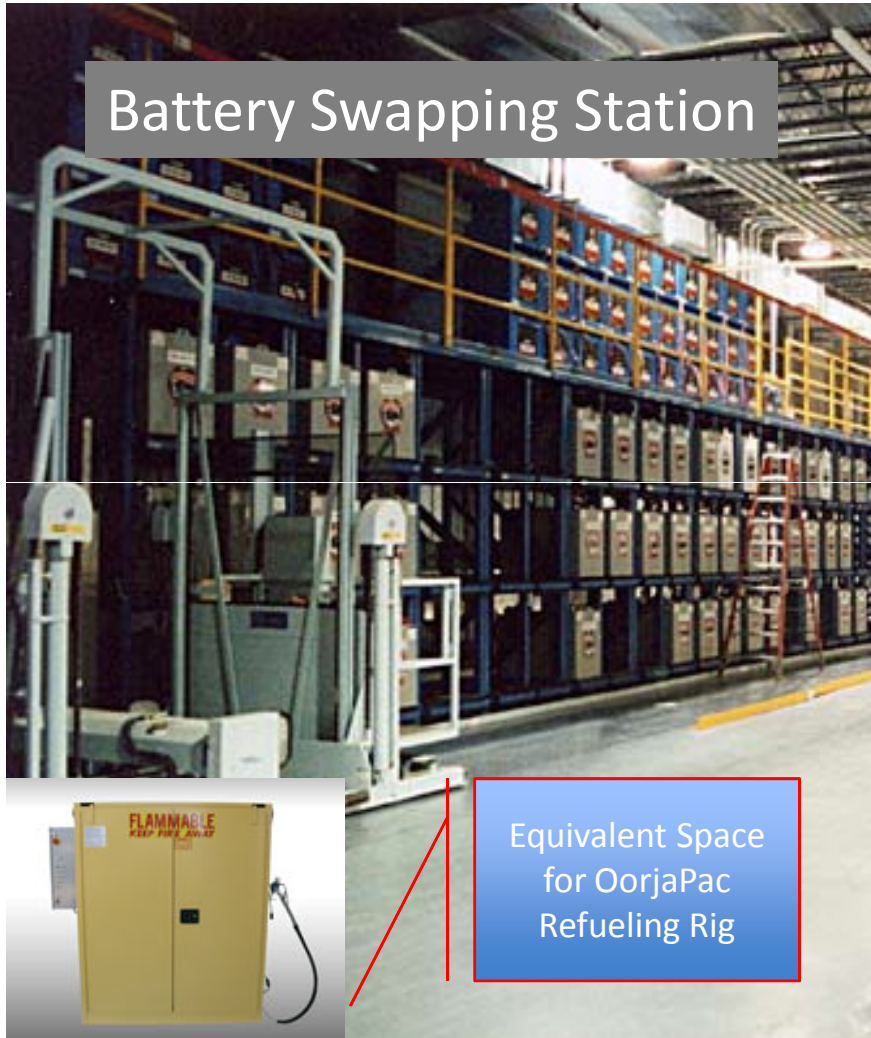
Classic Crossing the Chasm Product Strategy



- Shipped 500+ Systems in 3 years
- Backlog of 200+ Systems
- Multiple Repeat Purchase Orders
- Annual Production Capacity of 650 Systems
- Deployed 75 units under DOE's Market Transformation Program

## Current Solutions Expensive Infrastructure

Battery Swapping Station



Equivalent Space  
for OorjaPac  
Refueling Rig

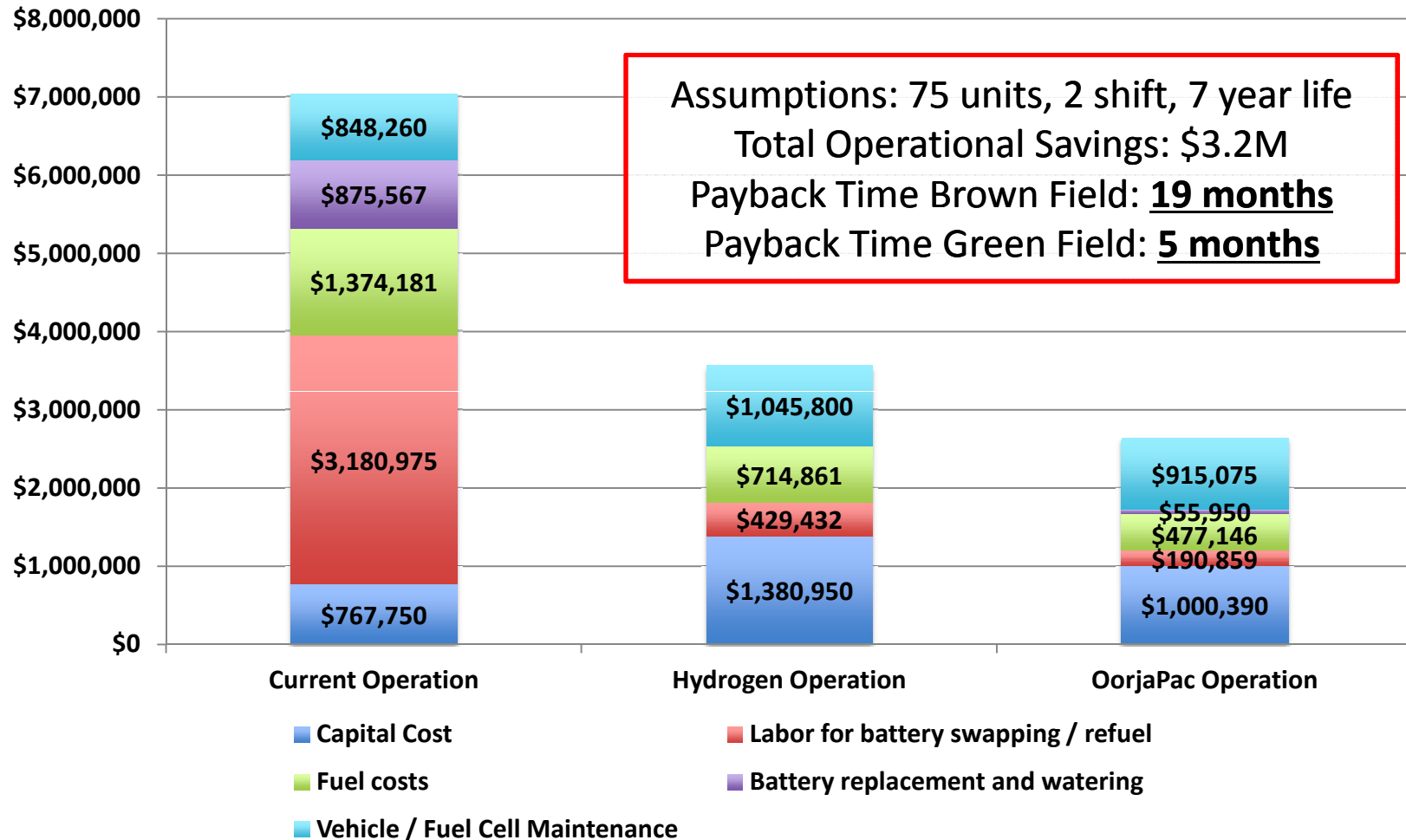
Rapid Charging Station



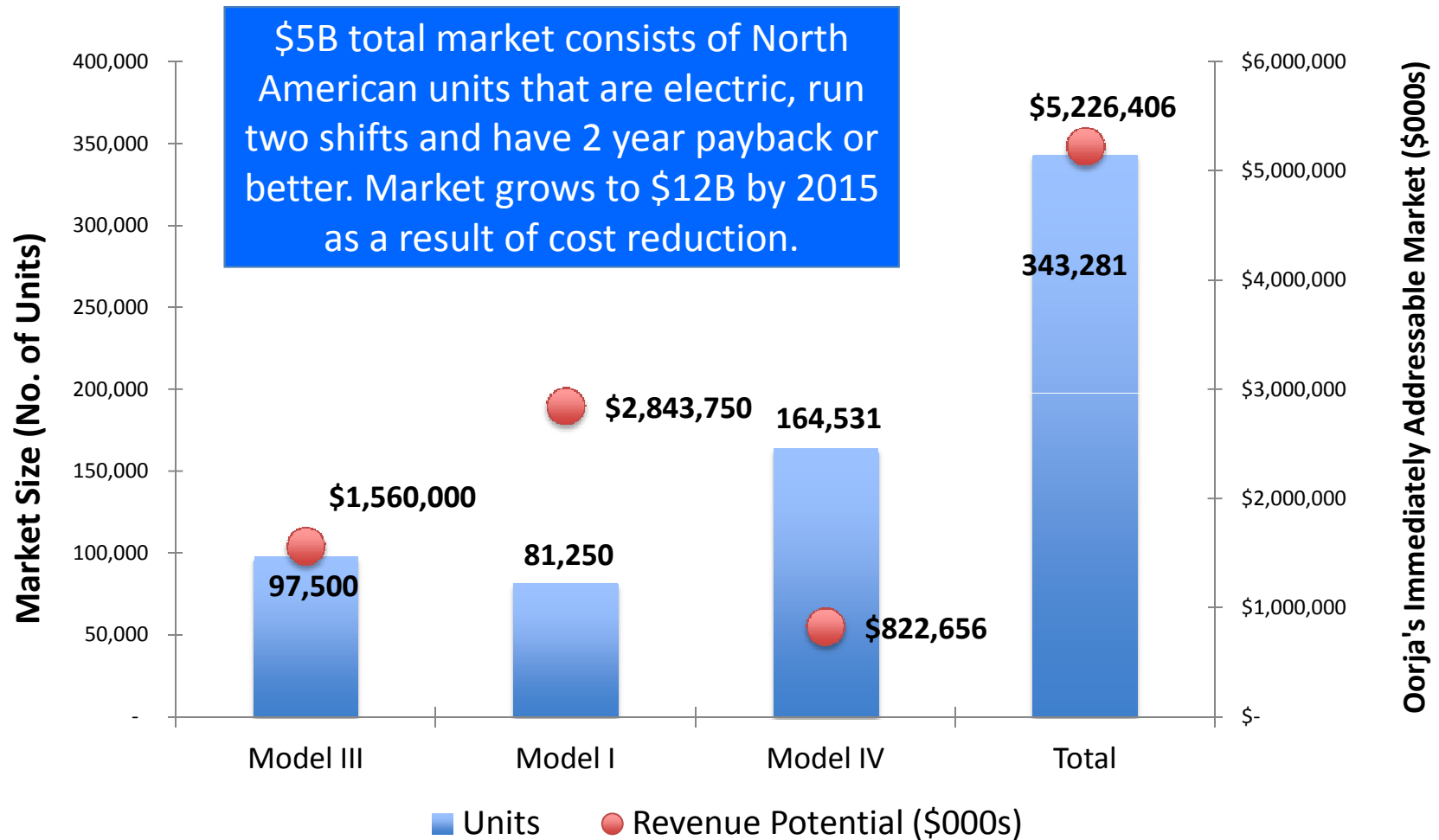
# OorjaPac saves OpEx and CapEx

Parameters	Conventional Charging of Lead Acid battery	Rapid Charging of Lead Acid Battery	Hydrogen Fuel Cells	Methanol Fuel Cells-OorjaPac
Runtime between Charges or Refueling	4-5 hrs	3 hrs	8-12 hrs	<b>15-16 hrs</b>
Total Downtime per Day for Battery Swap or Battery Charge or Refuel	30-45 mins	20-30 mins	4-8 min	<b>1-2 min</b>
Battery Life	3-5 years	2-3 years	NA	<b>6-7 years</b>
TCO per MHE per Year (7 Year life)	\$7,600	\$6,900	\$6,500	<b>\$3,700</b>
Infrastructure Cost (New installation)	\$0.5 Million	\$0.2-0.5 Million	\$0.3-0.5 Million	<b>\$15,000</b>

# Payback as Low as 5 Months

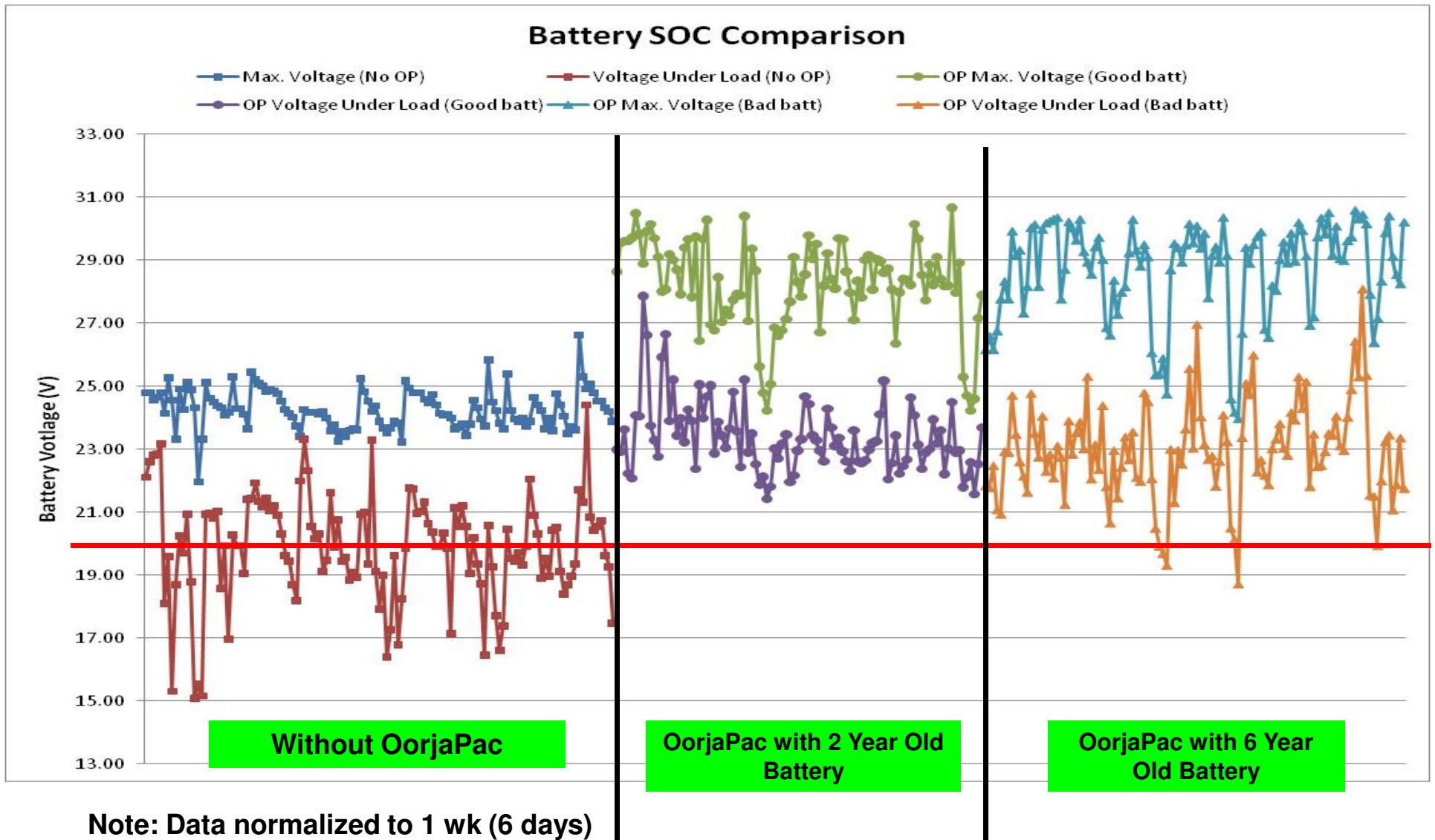


# \$5Billion Highly Qualified Market



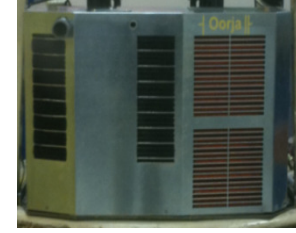
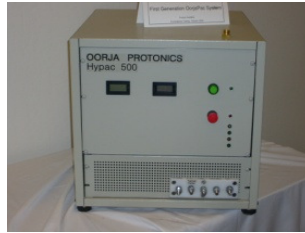


# OorjaPac Extends the Battery Life





# Oorja Dominates High-Power DMFC Evolution since 2006



	2006-'07	2007-'08	2008-'09	2009-'11
<b>System Power Output</b>	0.5 kW	1.2 kW	1.5 kW	1.5 kW 4.5 kW
<b>Stack Life (Hrs)</b>	500	1800	4500	8000
<b>System Power Density (W/liter)</b>	2.9	12.0	17.5	26.3
<b>Technology Challenges Addressed</b>	<ul style="list-style-type: none"> <li>• Methanol X-over</li> </ul>	<ul style="list-style-type: none"> <li>• Anode Stability</li> <li>• Power Density</li> </ul>	<ul style="list-style-type: none"> <li>• MEA Durability</li> <li>• Fuel Efficiency</li> </ul>	<ul style="list-style-type: none"> <li>• Catalyst Loading</li> <li>• Water Neutral</li> </ul>

# Wide Breadth of Oorja's DMFC Technology

	Samsung	SFC	Oorja	Comments
Nominal Power (W)	25	250	1500 and 4500	18X higher
Key Application	Military portable	mobile and portable	Forklift and Backup Power	
Output current (A)	1	20	62.5	3X higher
System Power Density (W-Hr/liter)	153	185	231(Model 3) 268 (Model 1)	1.5X
Stack Life (Hrs)	---	5000	8000	1.6X
Core Technology	-System integration	-System integration	-MEA Design -Stack Design -Water Management -Thermal Mgmt - System Integration	- Power Scalability -Wide Design Capability



Samsung

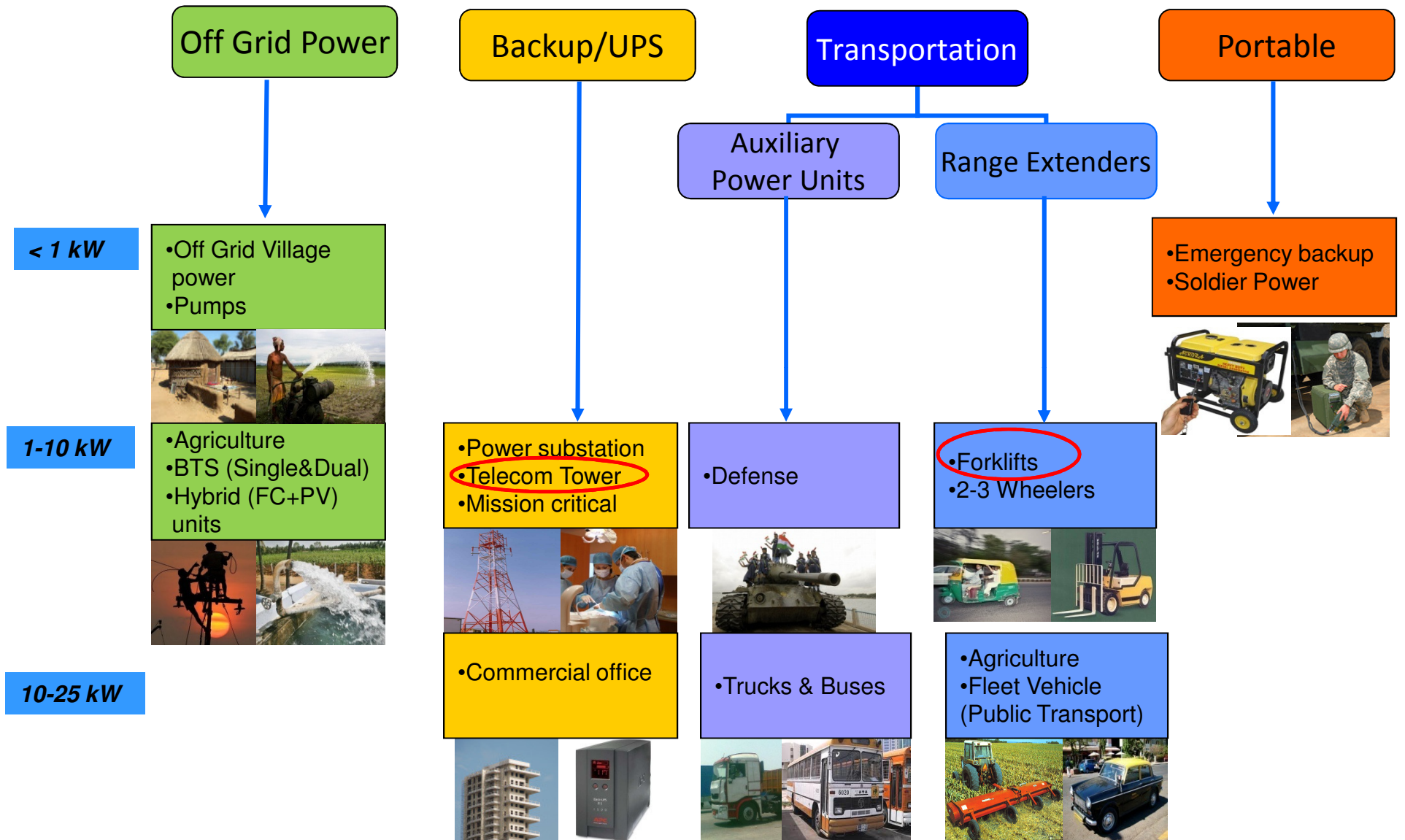


SFC

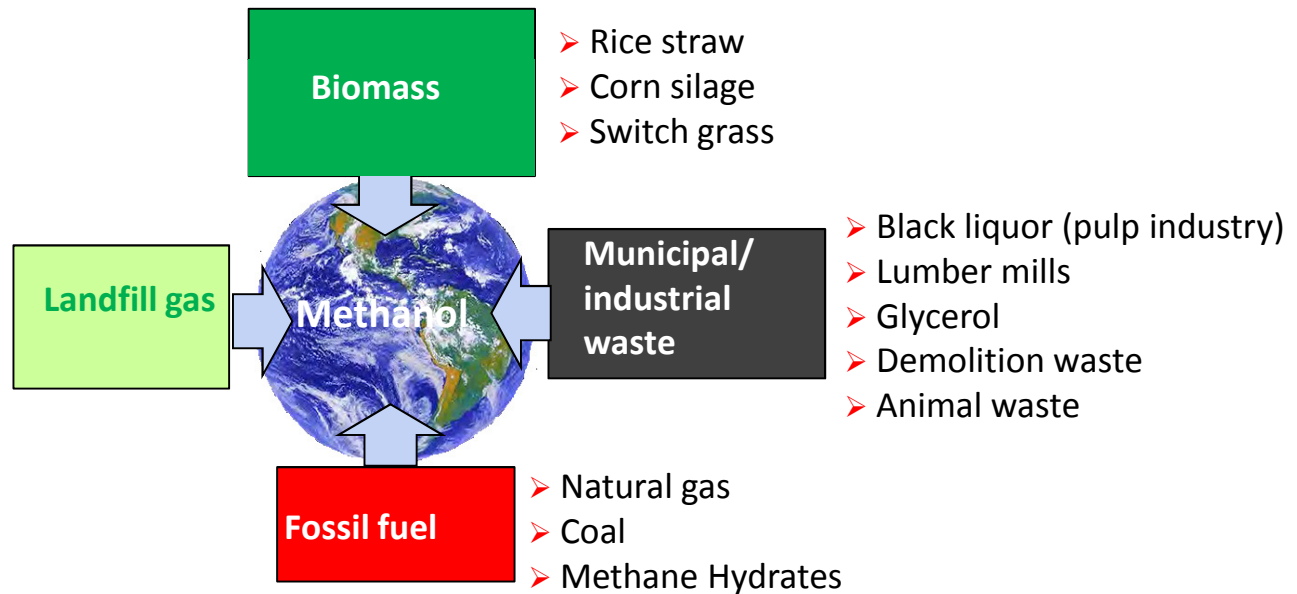


Oorja

# Oorja's Total Addressable Market is \$30 Billion



- Industrially produced from natural gas,
  - coal (reducing NO<sub>x</sub>, SO<sub>x</sub>)
- Ideal liquid energy from waste,
  - biomass (GHG reduction)
- Non-explosive, low flammability
- Decreased dependence on oil
- Methanol economy (Nobel Laureate Dr. George Olah)



# Oorja-A Compelling Story

## Technologically Superior

50x Power

Scalable

Ubiquitous Fuel

## Repeat Volume Sales

Traction in \$5B Market

Tier 1 Customer Sales

Increasing Sales Volume

## Financially Compelling

Breakeven Gross Margins

Capital Efficient

Best Payback