

Ohio Fuel Cell Symposium

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Agenda

Introduction and background

Markets and Potential

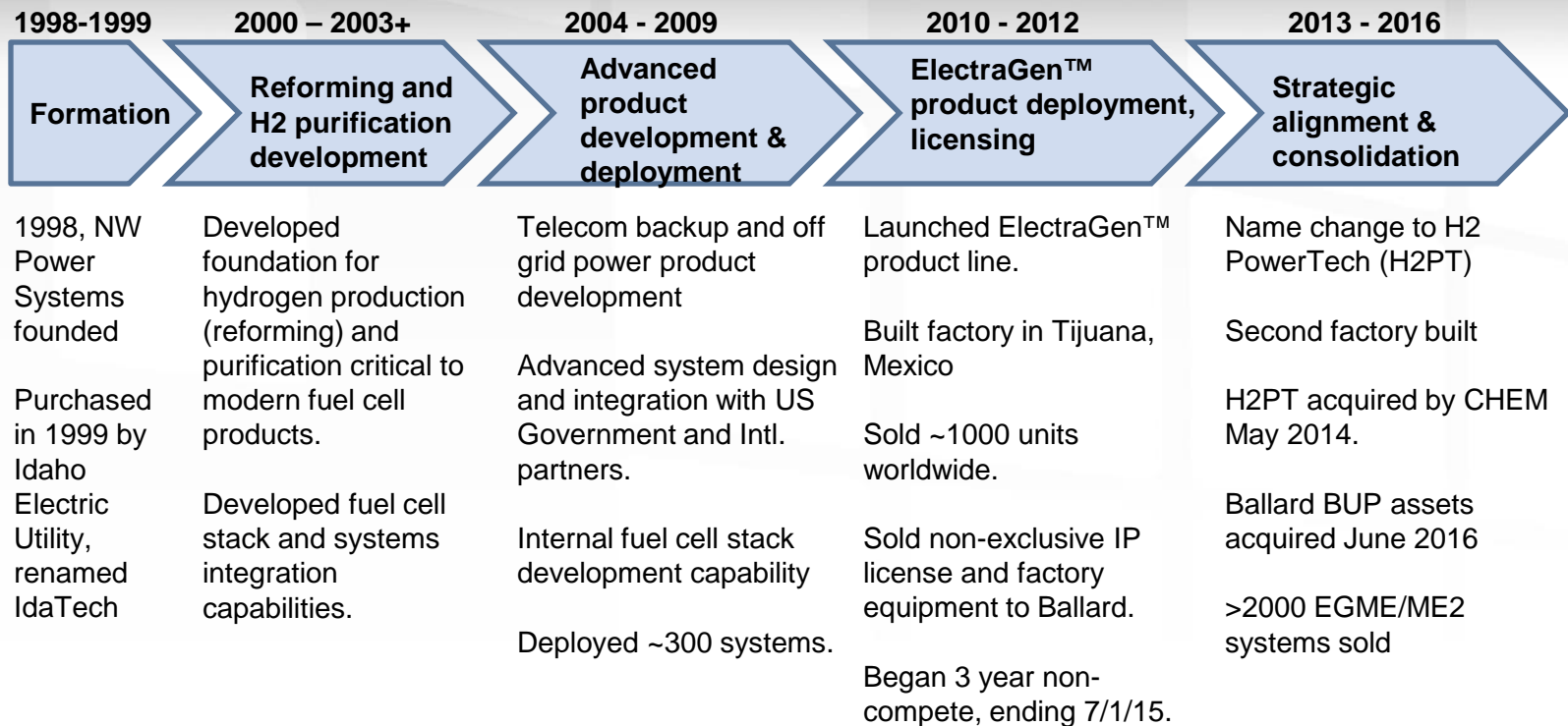
Products and Supply Chain



Introduction and Background



IdaTech – H2PT Background

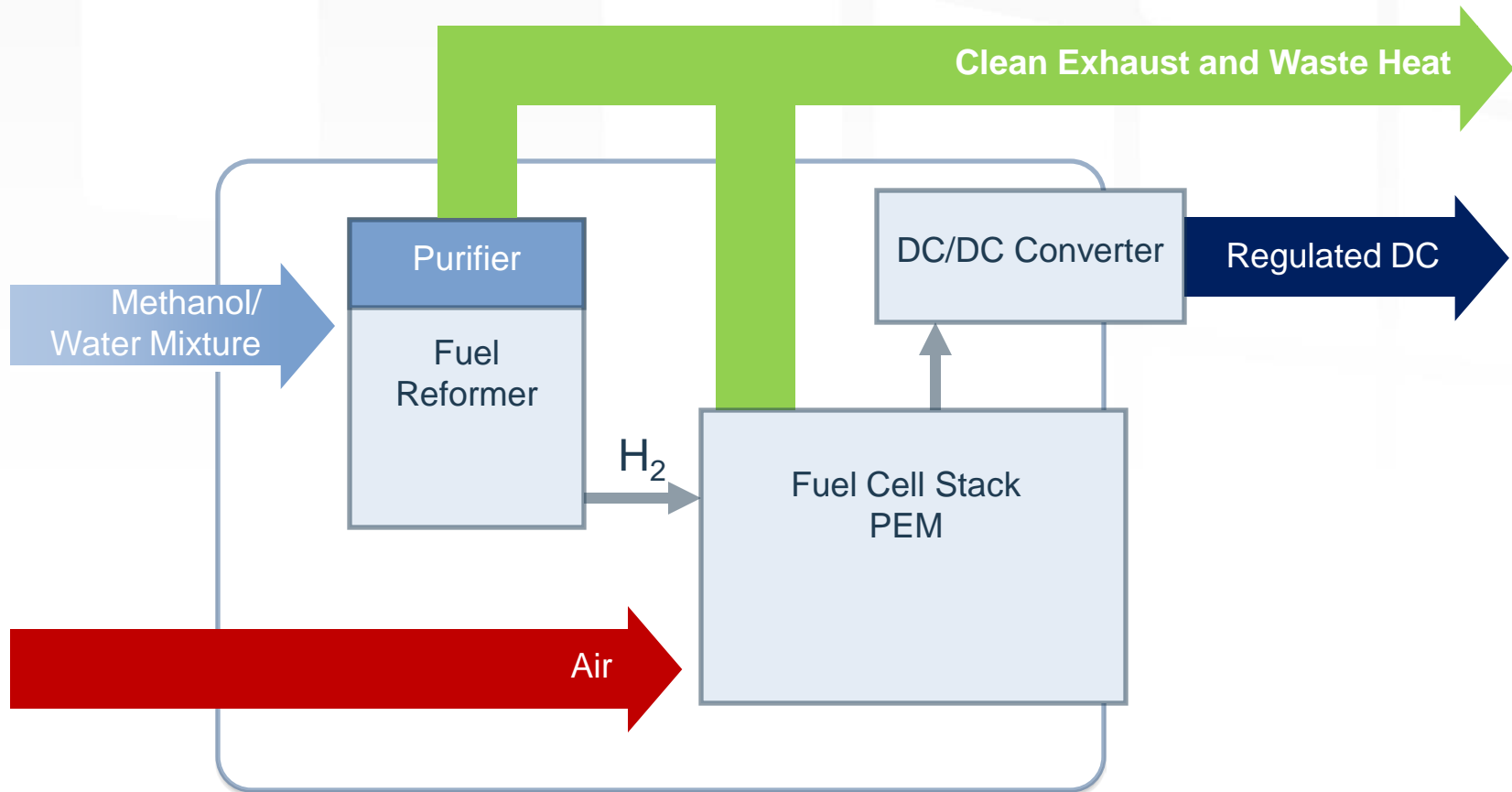


- All commercial methanol fuel cell products based on licensed IP
- >15 years of experience and more than \$240 million invested
- IP based on >380 patents awarded and pending
- Continuing core development for advanced fuel cell products



Methanol Fueled Power System

Highly Efficient Reformer Extracts Hydrogen from Liquid Fuel



Markets and Potential



Core Markets

Telecommunications

Backup and off grid power
>\$3 billion/year market



- **Characteristic:** Poor (or no) grid (developing nations), or need to guard against long term outages (developed nations)
- **Opportunity:** Backup diesel generators are unreliable, noisy, pollute and subject to theft (equipment and fuel)
- **Geographies:** Asia, India, Africa, Central and Latin America (poor grid); USA (high reliability)

Community Power

Off grid / micro-grid
~500 million people w/o power (but with cell phones)



- **Characteristic:** Massive expansion of mobile phones into communities not served by electric grid
- **Opportunity:** Diesel generators are unreliable, noisy, pollute and subject to theft (equipment and fuel), and higher cost
- **Geographies:** Africa, India, SE Asian Islands

South African FC Demonstration

3 Fuel Cells, powering 34 homes, off grid, for 2 years



China Installation Examples

ME²POWER
FUEL CELL SYSTEMS

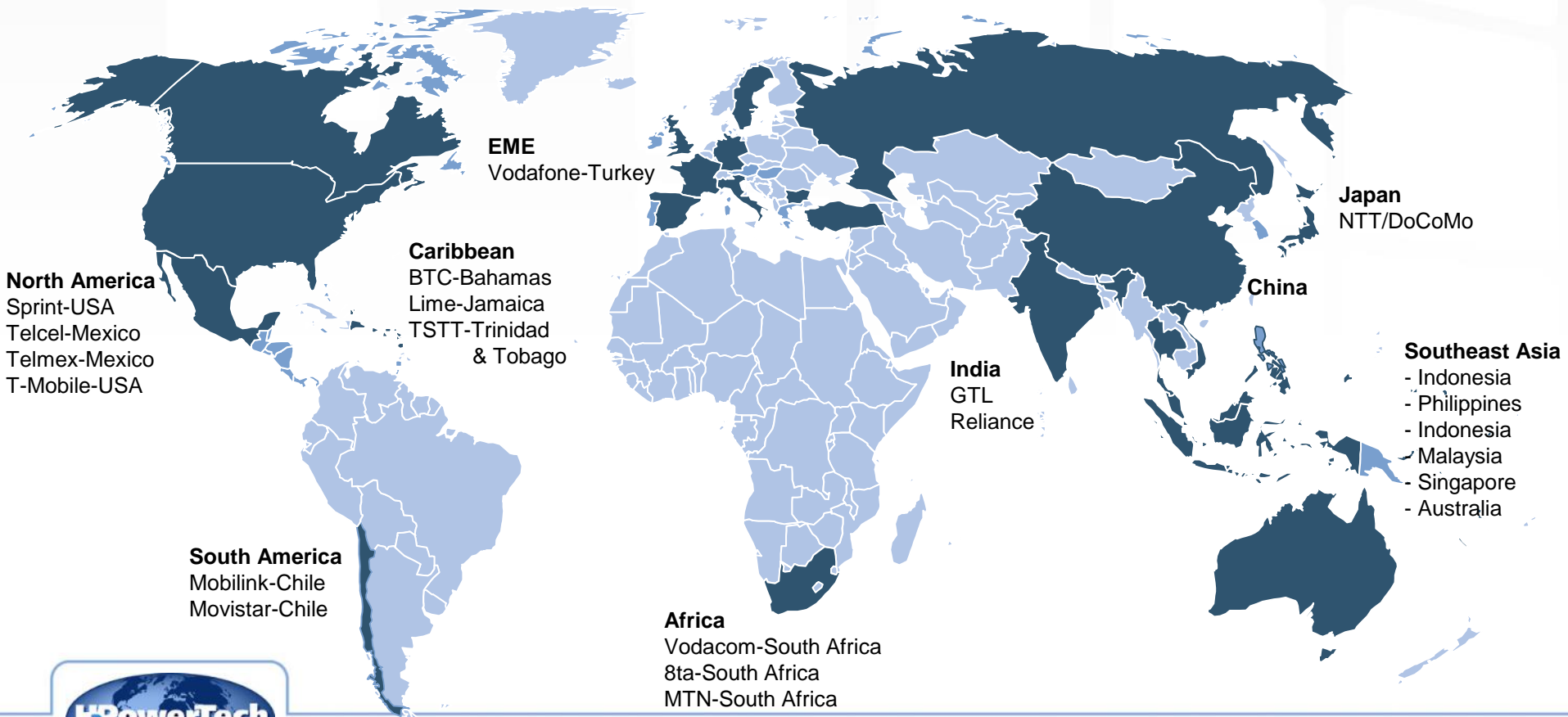


Global Deployment

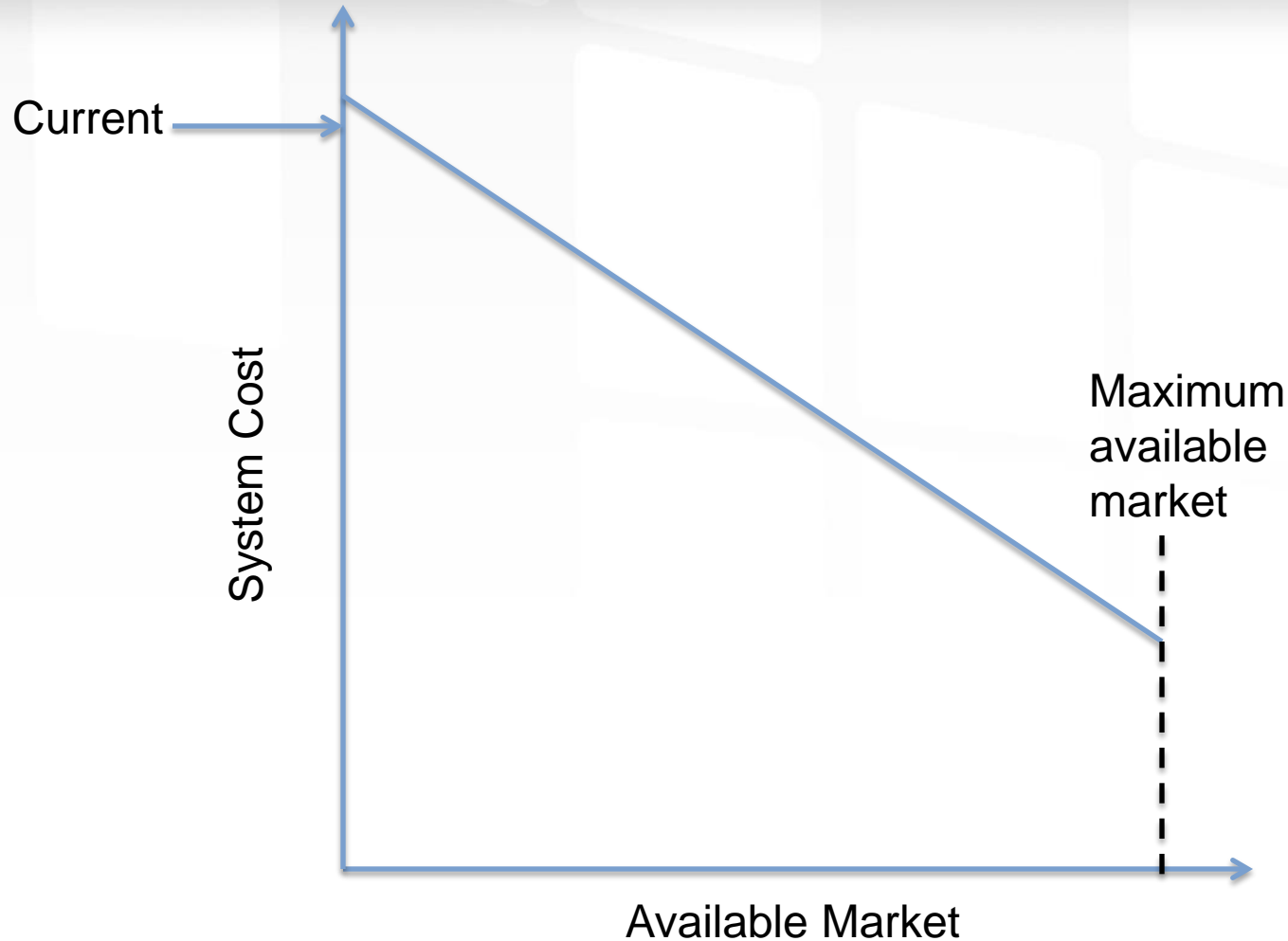
2,000+ Systems in 30+ Countries



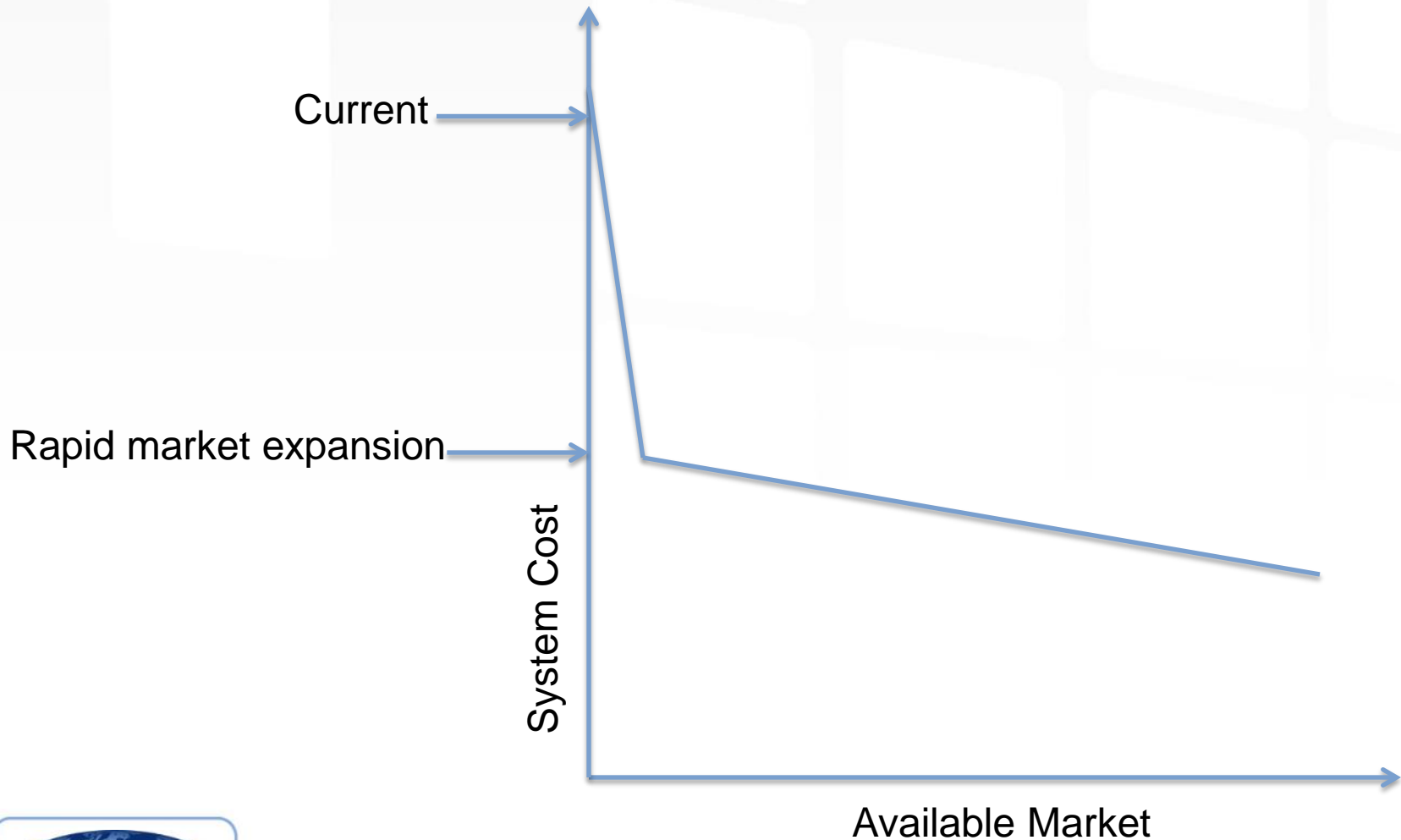
Countries where IdaTech's fuel cell systems have been sold



Market Adoption Curve?



More Realistic Curve



Products and Supply Chain



Methanol Systems

Methanol Fuel Cell Product Evolution

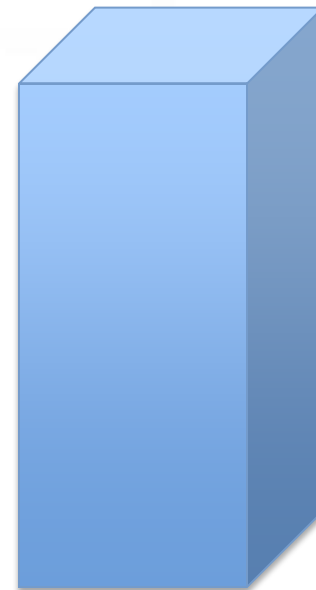
Early Methanol System
(100's deployed)



Current System
(1000,s deployed)

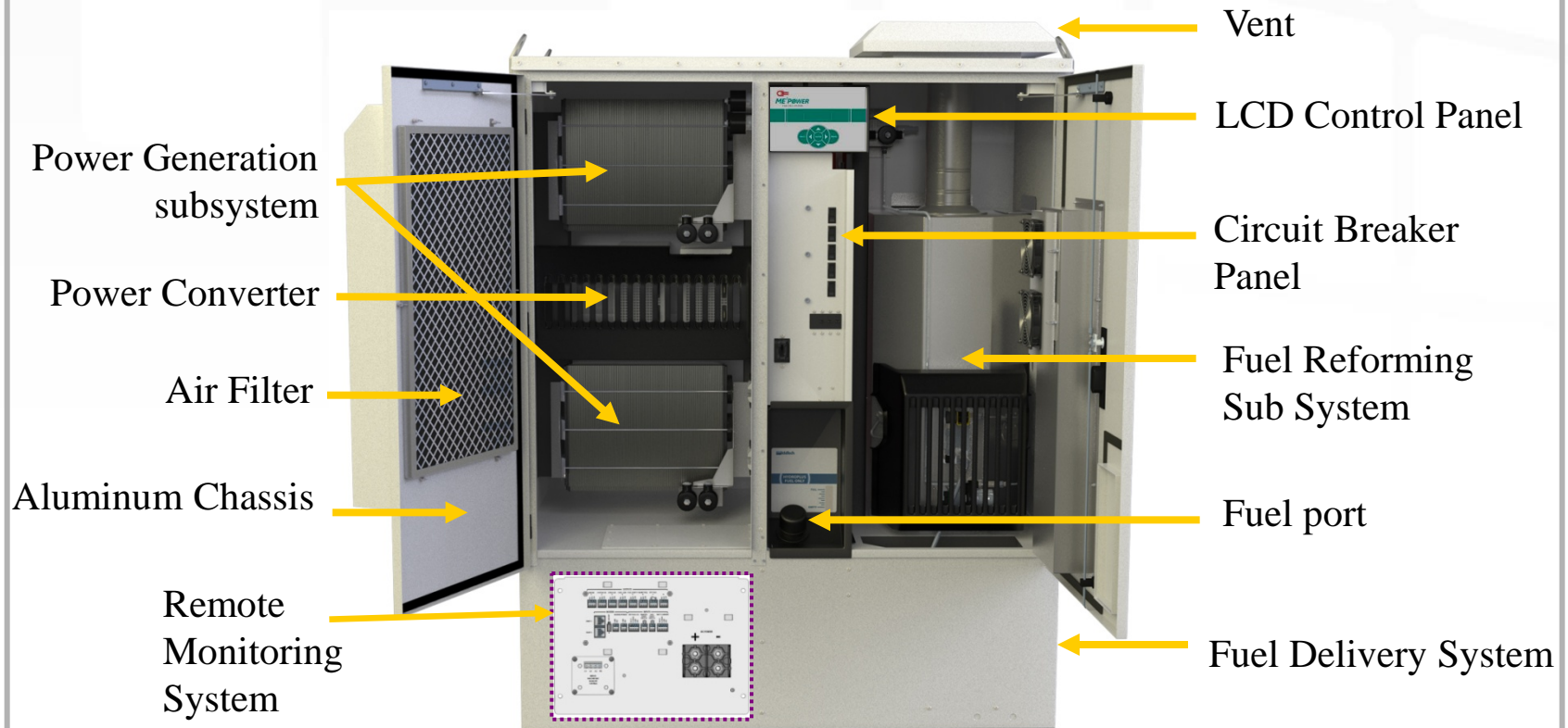


NextGen System
(2017)



ME² POWER System Structure

Fuel Cell system is comprised of 3 main components: (1) fuel delivery, (2) fuel reforming, and (3) power generation subsystem.



Selected Part Characterization

Part	Description	Comments
Graphite bipolar plates	Custom	
Metal bipolar plates	Custom	Development
MEA's	Custom	Supply concentration
Cathode air blower	Commercial	48 VDC, 400 SLPM at 1.5 pressure ratio
Fuel pump	Commercial	24 or 48 VDC, 100 mL/min at 180 psig
Coolant pump	Commercial	23 L/min at 530 mBar
Combustion air blower	Commercial	24 or 48 VDC, 11.5g/s at 1.015 pressure ratio
DC Converter	Custom	> 95% efficient, nominally 5kW output
H2 pump	Custom	24 or 48 VDC
Humidifier	Custom	
Solenoid operated valves	Commercial	12 or 24 VDC. Needs to seal against H2



Examples of Parts

Water/fuel Pump



DC Converter



Humidifier



Graphite Bipolar Plate



Air Blower



Thank you

