Fuel Cell Portable Power
Department of Energy Workshop

January 17, 2002

Power to Change the World™

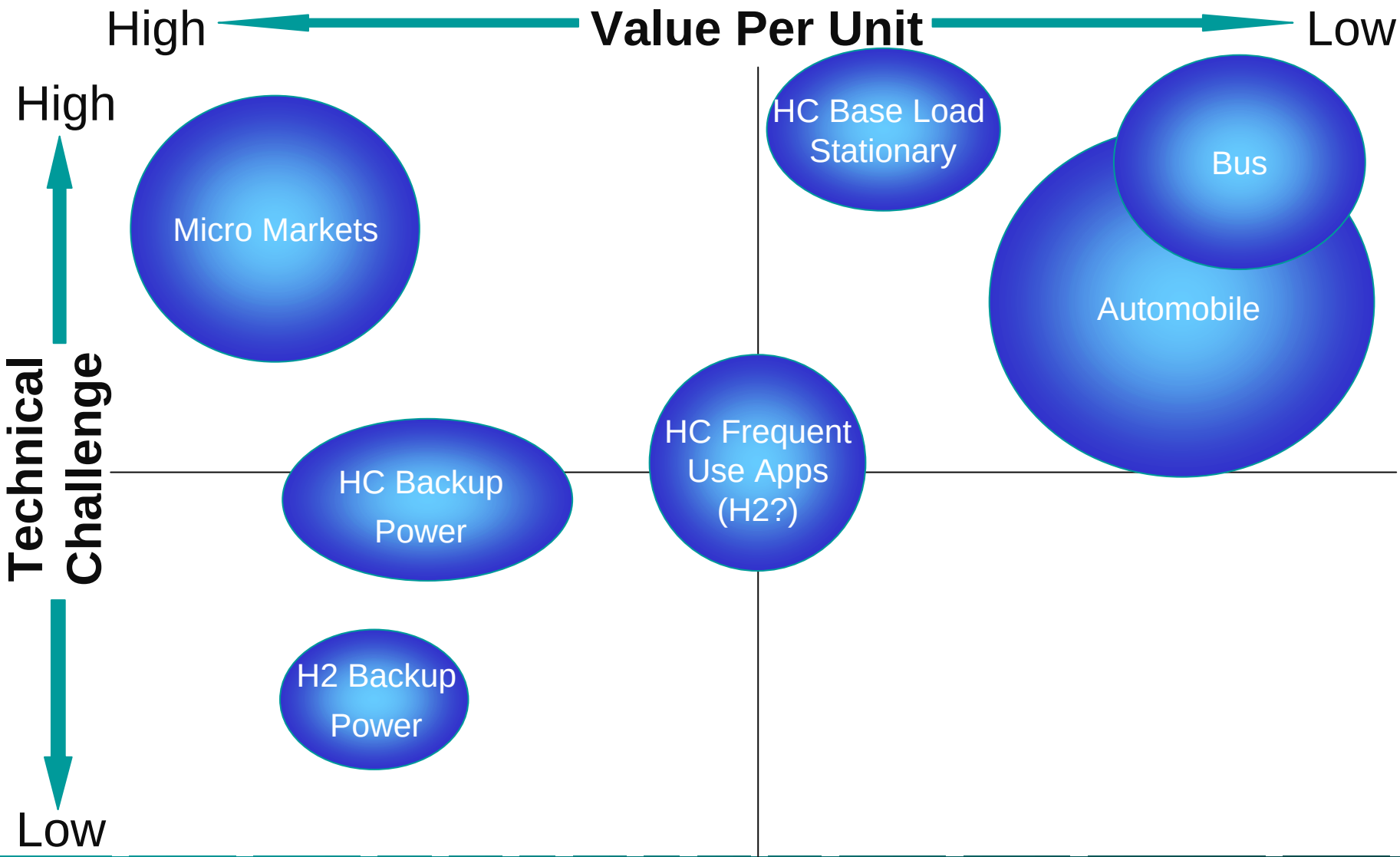
BALLARD®

Portable Markets - Table of Contents

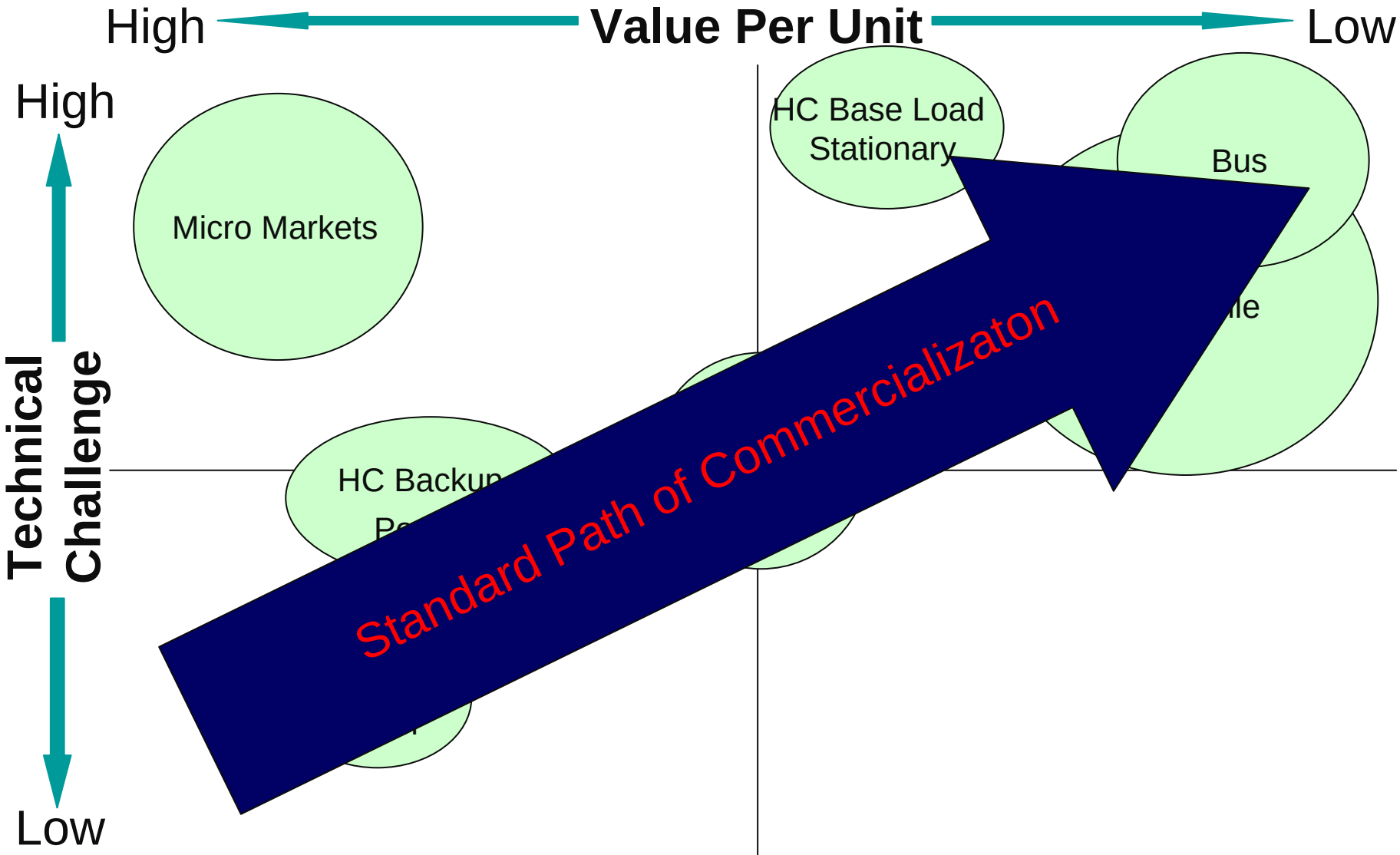
Opportunity Summary - Portable Markets

	Infrequent	Frequent
Typical Applications	Backup – Batteries & Gensets	Peaking power and seasonal use; mobile power
Preferred Fuels	Hydrocarbon & Hydrogen	Hydrocarbon (H2?)
Total Available Market	***Large – But Fractured into many apps***	Moderate
Price Target	Low (Pockets willing to pay high $ for certain attributes)	Moderate (Lifecycle)
Environmental Impact	Low	Moderate
Timing	Short term	Mid term

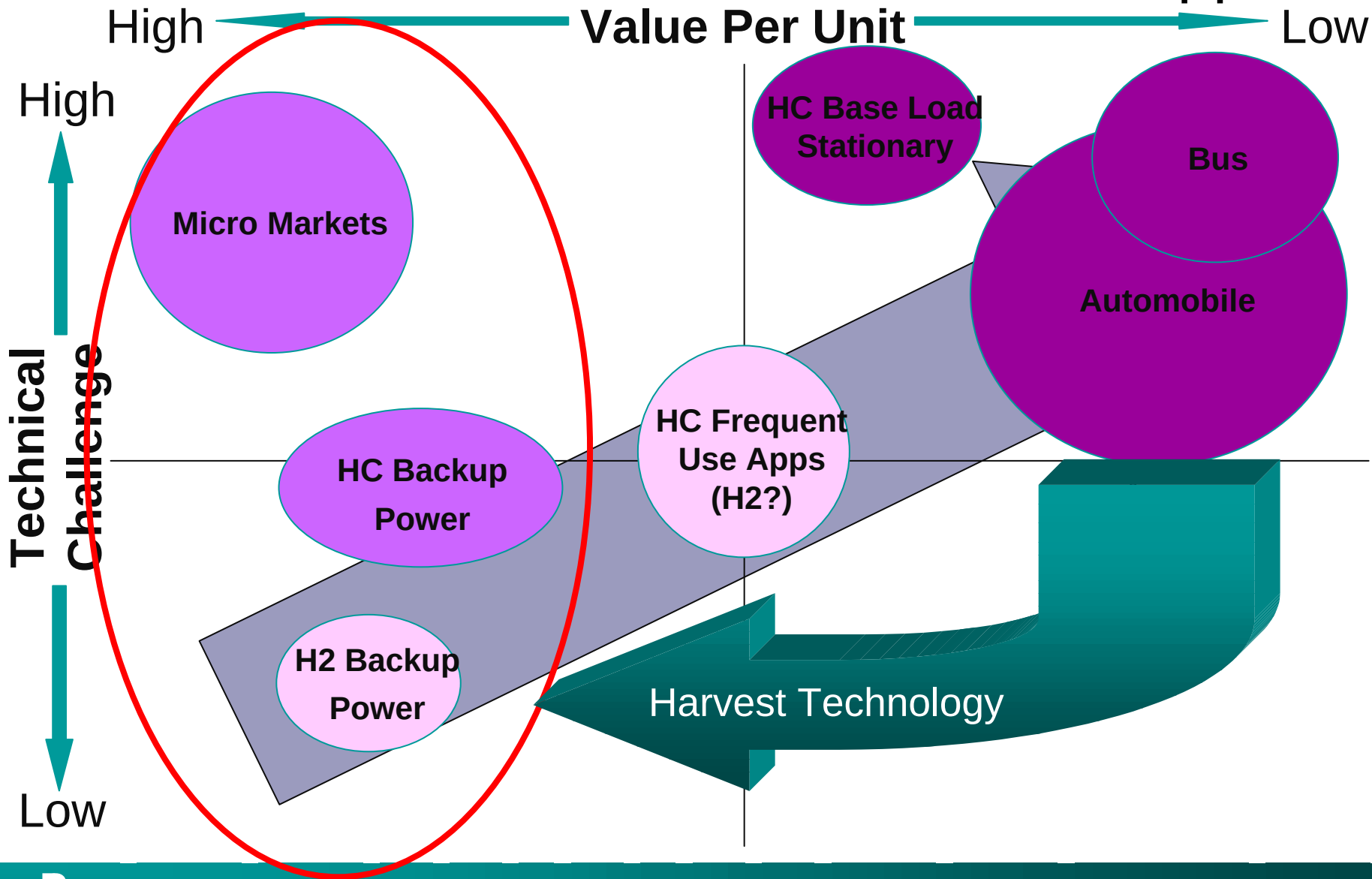
Commercialization Path



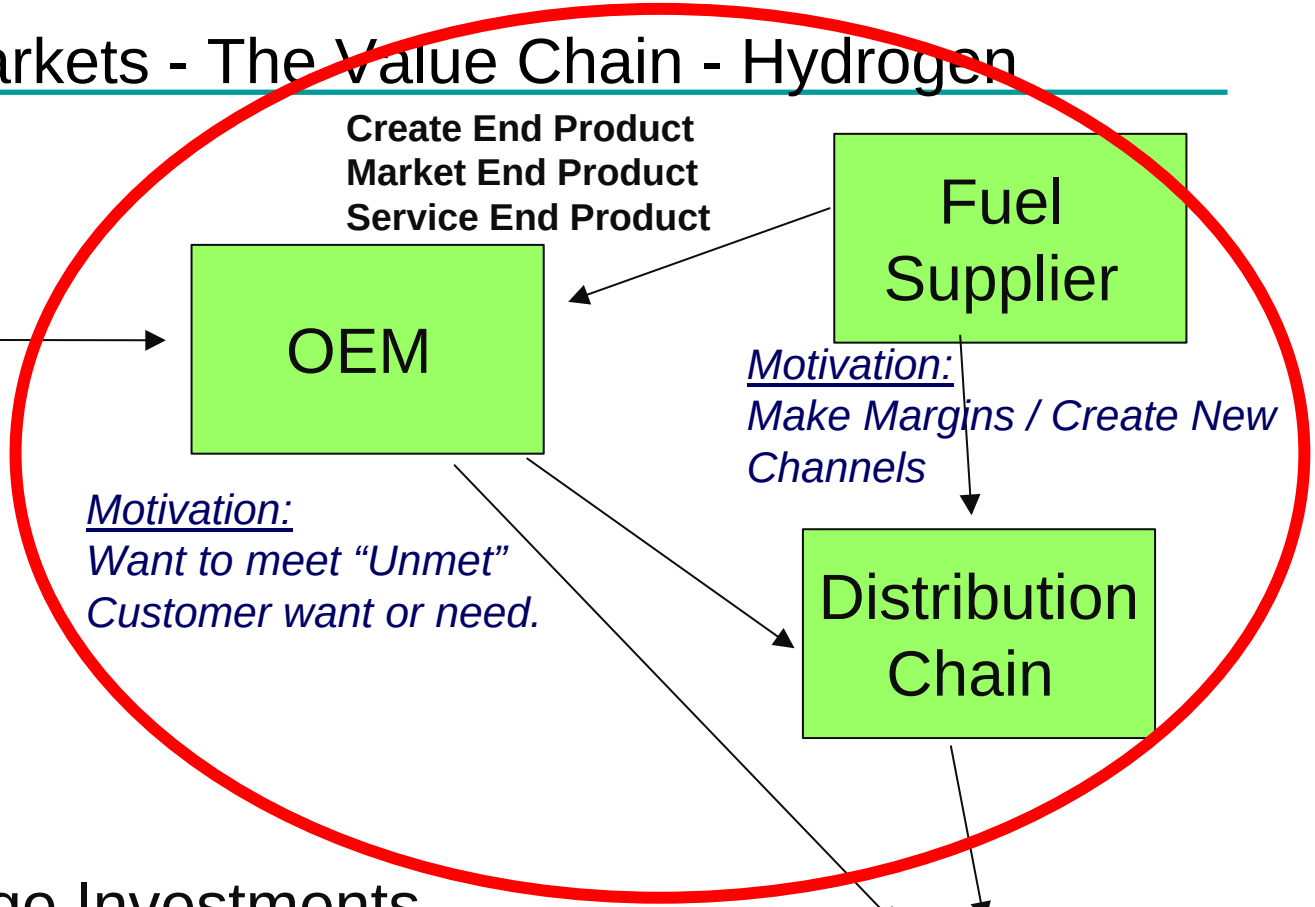
Commercialization Path



Commercialization Path – Resources Applied



Portable Power Markets - The Value Chain - Hydrogen



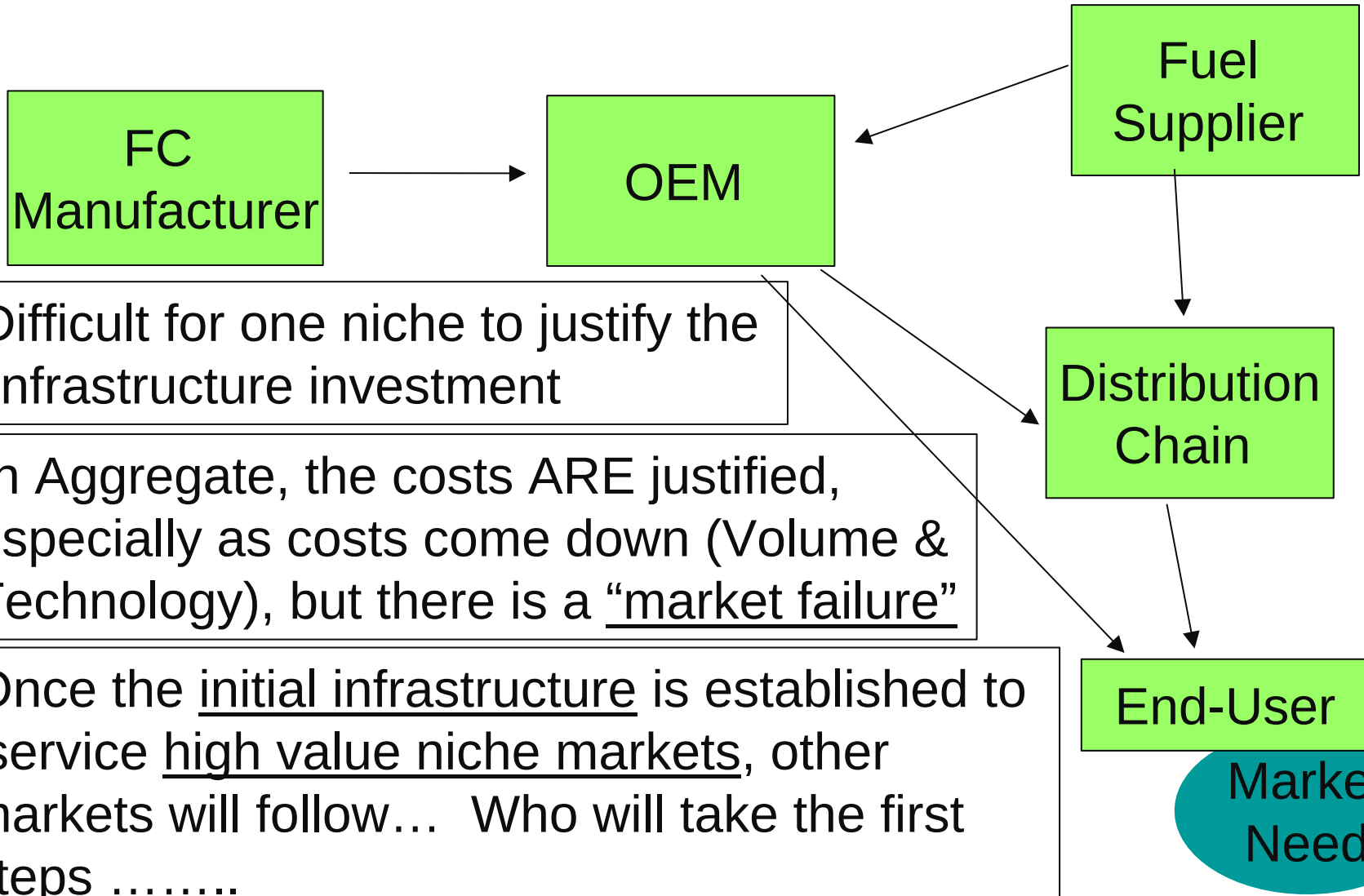
Motivation:
Originally Pulled by Auto makers, Now want to "Push" harvested technology into market place earlier.

Large Investments

- Product Development
- Product Safety & Certification
- Distribution Channel Development
- Filling Distribution Channel

Market Need

Portable Power Markets - The Value Chain - Hydrogen



- Difficult for one niche to justify the infrastructure investment
- In Aggregate, the costs ARE justified, especially as costs come down (Volume & Technology), but there is a "market failure"
- Once the initial infrastructure is established to service high value niche markets, other markets will follow… Who will take the first steps ……..

Nexa™ Power Module - Description

H_2 In DC Out Power Module

Rated Net Output:

1200W, 26V output at full power

Dimensions: L x W x H

56 x 25 x 33 cm (22 x 10 x 13 in)

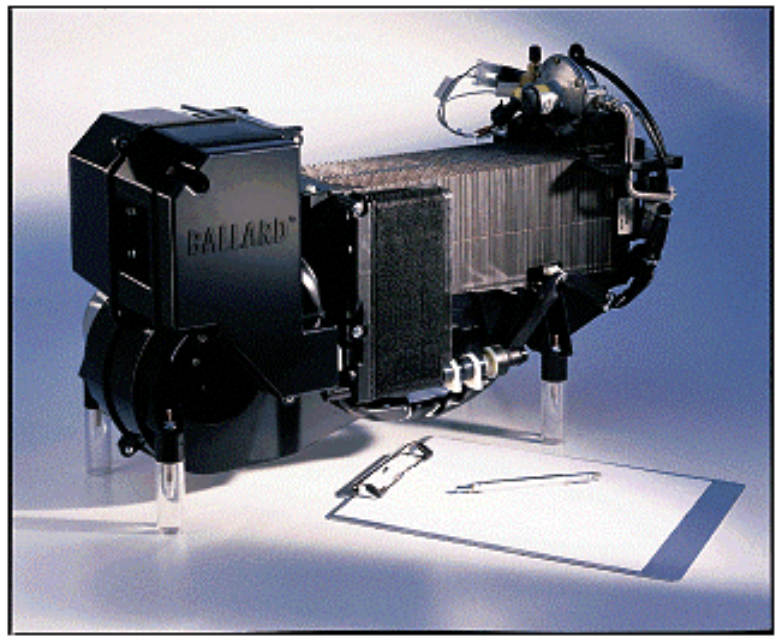
Certification: CSA, UL

Operating Environment:

3°C to 30°C (37°F to 86°F)

Lifetime: 1500 hours

Application: Backup or intermittent



Portable Power - Fuel Options

H_2

Metal Hydride

- TOH
- JSW
- JMC
- GfE

ISSUES:
1) Infrastructure
2) Weight (MH)
3) Cost

Chemical Hydride

- M-Cell

Compressed H2

ISSUES:
1) Industrial Use Only

Portable Hydrocarbon

Propane / Butane

- MEW

Methanol

- DMFC
- IdaTech
- Xcellsis

ISSUES:
1) Start Up Time
2) Cost/Volume
3) Emissions

Possible Future Option
- Carbon Storage

Portable Power

Conclusions.. Where can the DOE Help:

Barriers Remaining:

1) Fuel Storage Technologies (Invest in Development)
2) Further FC Cost Reduction (part of Auto Programs)
3) Further FC Envelope Expansion (Cold Start etc – Auto)

Other Assistance:

1) H2 Credits for reduction of cost of products at introduction.
2) H2 Infrastructure Development initiatives.