

# Hydrogen Technical Advisory Committee (HTAC)

Portable Power Products: Barriers to Market

January 9, 2007

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# Agenda

- Jadoo Power Overview
- Market Barrier Example
- What Can HTAC Do?

# Jadco Power Overview



- Privately Held Company – Sacramento, CA
  - Founded November, 2001
- Fuel Cell Systems Manufacturer
  - Over 1,000 Products Commercially Sold
- Commercialization Stage
  - Markets:
    - Power Support
    - Battery Replacement



**Power Support Products**

**Battery Replacement Products**



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# Example: Professional Broadcast Market Price Comparison



## Battery system

Batteries (3)	\$1,575
Charger	\$1,350
<b>Total</b>	<b>\$2,925</b>



## Jadoo system

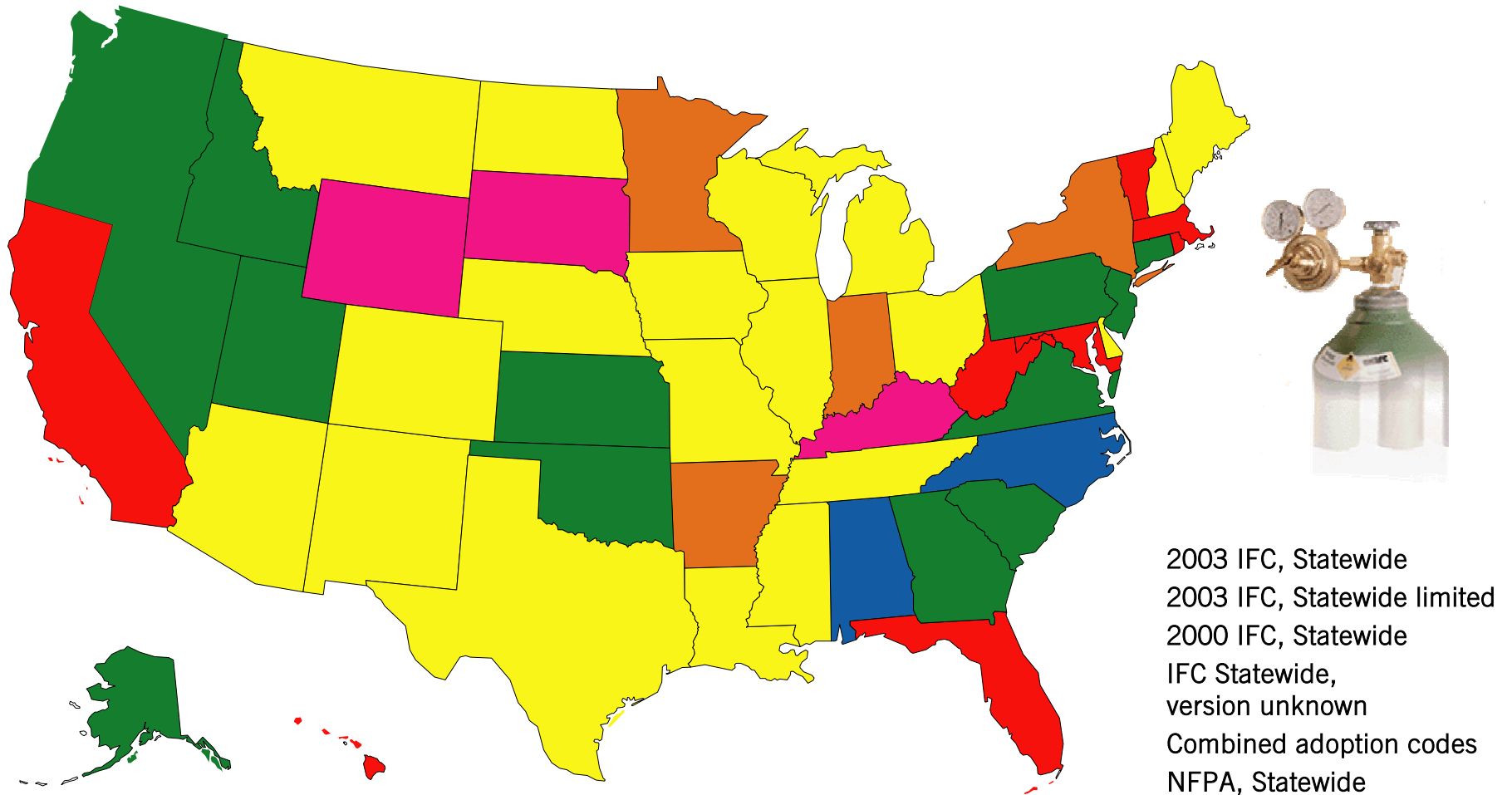
Fuel Cell with 2 hydrides	\$1,900
Refilling Station	\$600
<b>Total</b>	<b>\$2,500</b>

## Fuel Cell Benefits Over Batteries

Cost	15% Less
Runtime	250% Longer
Recharge time	100% Faster

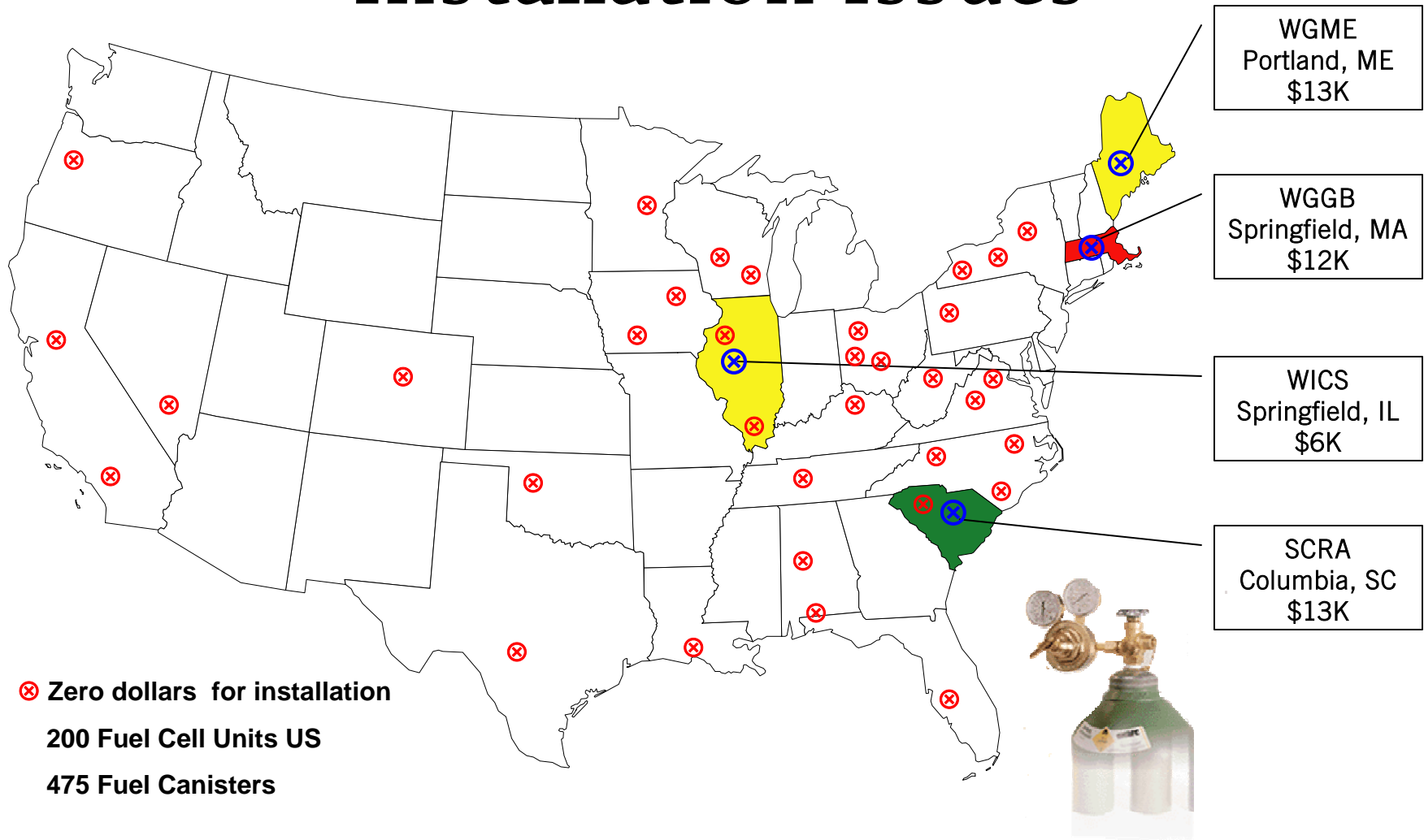
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# Fire Code Adoption By State



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# Installation Issues



⊗ Zero dollars for installation

200 Fuel Cell Units US

475 Fuel Canisters

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# Transportation: The Barrier To Portable Power



**NiCd**



**Li-ion**  
(8 grams Lithium)



**Metal Hydride**  
(9 grams Hydrogen)

## Transportation Status:

	NiCd	Li-ion	Metal Hydride
<b>Passenger Carry On</b>	<b>Yes</b>	<b>Yes</b>	<b>No</b>
<b>Air Cargo International</b>	<b>Yes</b>	<b>Yes</b>	<b>No</b>
<b>Air Cargo US</b>	<b>Yes</b>	<b>Yes</b>	<b>No*</b>

\* Special Permits Only

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# Example: Shipping Fuel Canisters

- Special Permits – What are they for?
  - Used when products do not meet current codes and regulation requirements.
- Special Permits – How do you get one?
  - Extensive testing for safety, durability and reliability.
- Special Permits – Who cares?
  - Cargo carriers have different reactions
    - FedEx – Special Permits NOT RECOGNIZED
    - UPS – classified as passenger aircraft – Special Permits NOT RECOGNIZED
    - DHL – Special Permits OK



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# Shipping Hazardous Materials

- Classified As:
  - Hydrogen Absorbed In A Metal Hydride Storage System
- Hazard Class of NSFSC:
  - 2.1 Flammable Gas.
  - Special provisions required
- Packaging and Shipping Requirements:
  - Completing shipping papers
  - Providing and maintaining emergency response information
  - Self-certification (Adequately Trained)



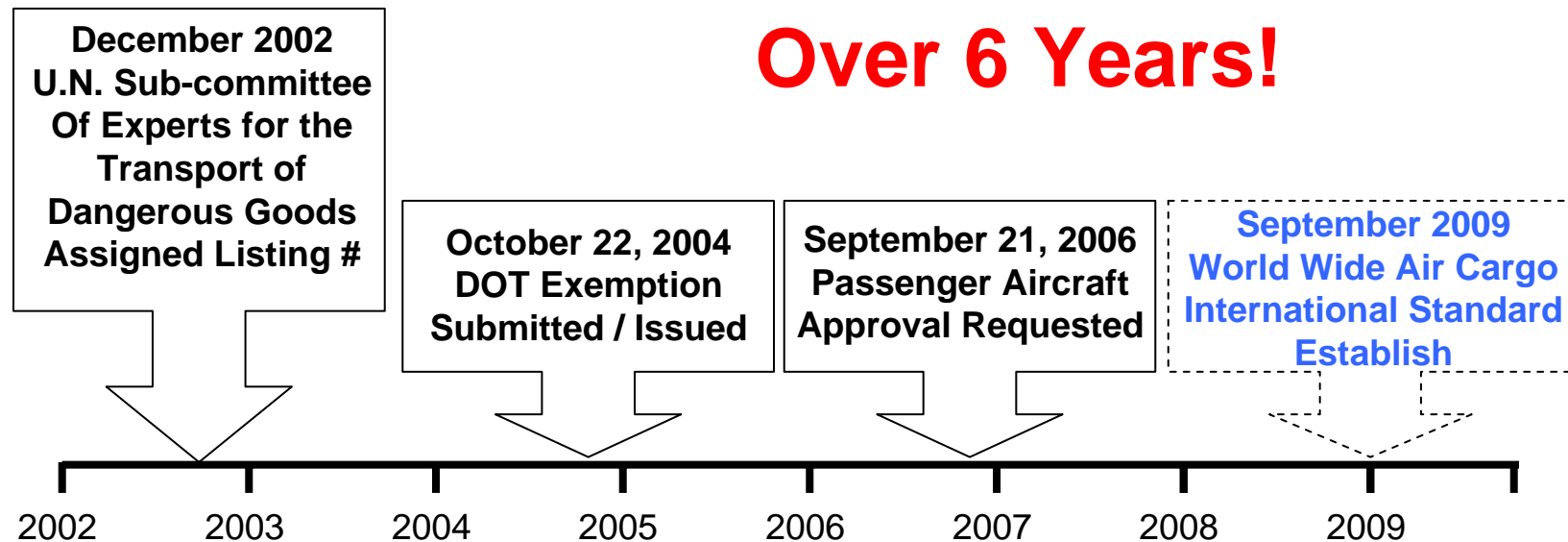
# International Air Cargo

## IATA Dangerous Goods Regulations

UN/ ID no. A	Proper Shipping Name Description B	Class Or Div C	Passenger and Cargo Aircraft				Cargo Aircraft Only	
			Ltd Qty		Pkg Inst I	Max Net Qty/Pkg J	Pkg Inst K	Max Net Qty/Pkg L
			Pkg Inst G	Max Net Qty/Pkg H				
3468	Hydrogen in Metal Hydride Storage System (1.5% by weight)	2.1	—	—	Forbidden		Forbidden	
1978	Propane	2.1	—	—	Forbidden		200	150kg
1203	Gasoline	3					307	60L
3319	Nitroglycerin mixture desensitized, solid with more than 2% but not more than 10% nitroglycerin by weight	4.1	—	—	Forbidden		435	0.5kg

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# International Approval Timeline



# What Can HTAC Do?

- Identify all early market barriers and develop a plan to reduce or eliminate.
- Develop strong recommendations to facilitate change.
- Define the appropriate risk between fuel innovations time to market and regulatory process.