

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
Total	\$2,925



Jadoo system

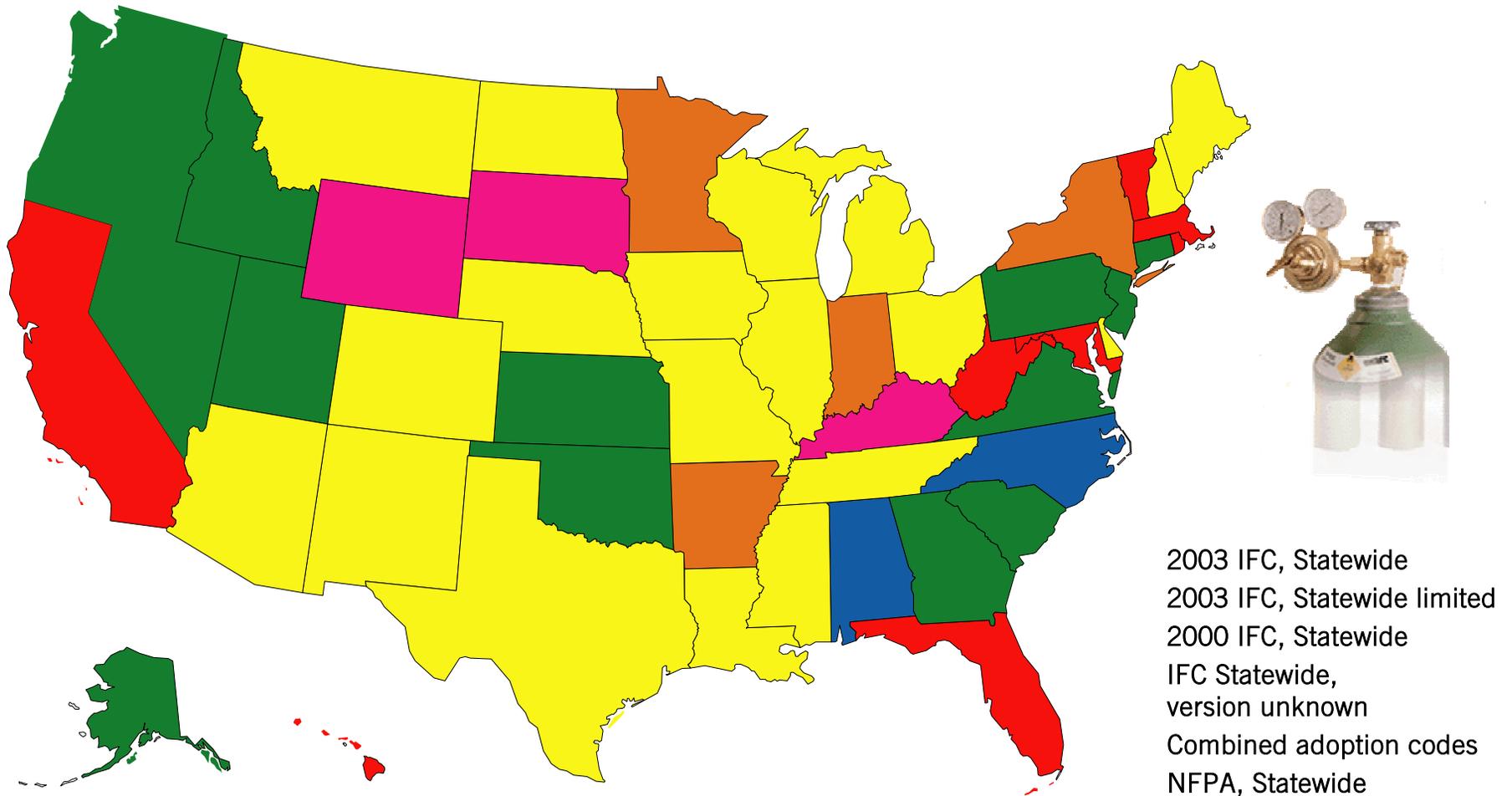
Fuel Cell with 2 hydrides	\$1,900
Refilling Station	\$600
Total	\$2,500

Fuel Cell Benefits Over Batteries

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

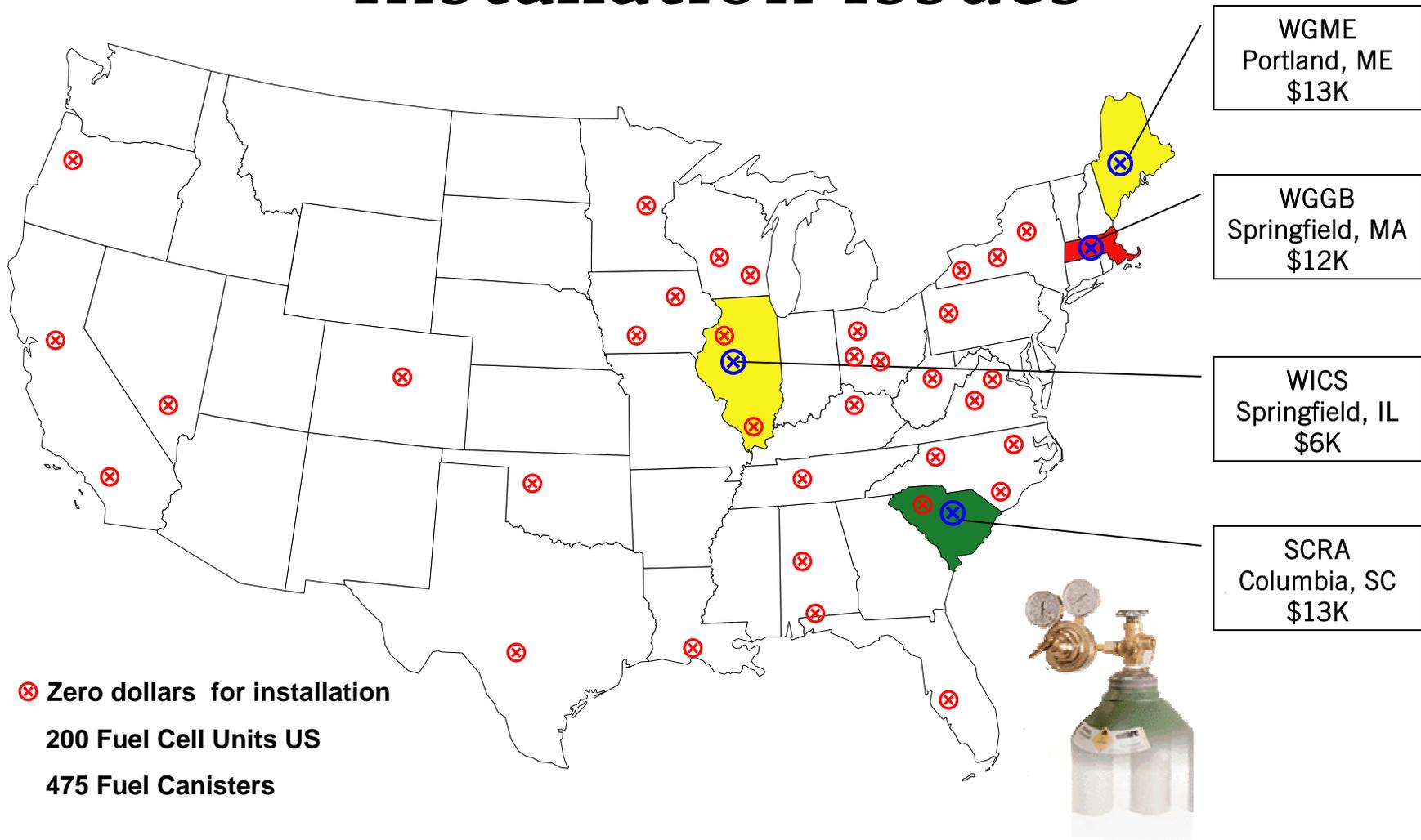
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Fire Code Adoption By State



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Installation Issues



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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
Passenger Carry On	Yes	Yes	No
Air Cargo International	Yes	Yes	No
Air Cargo US	Yes	Yes	No*

* 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)



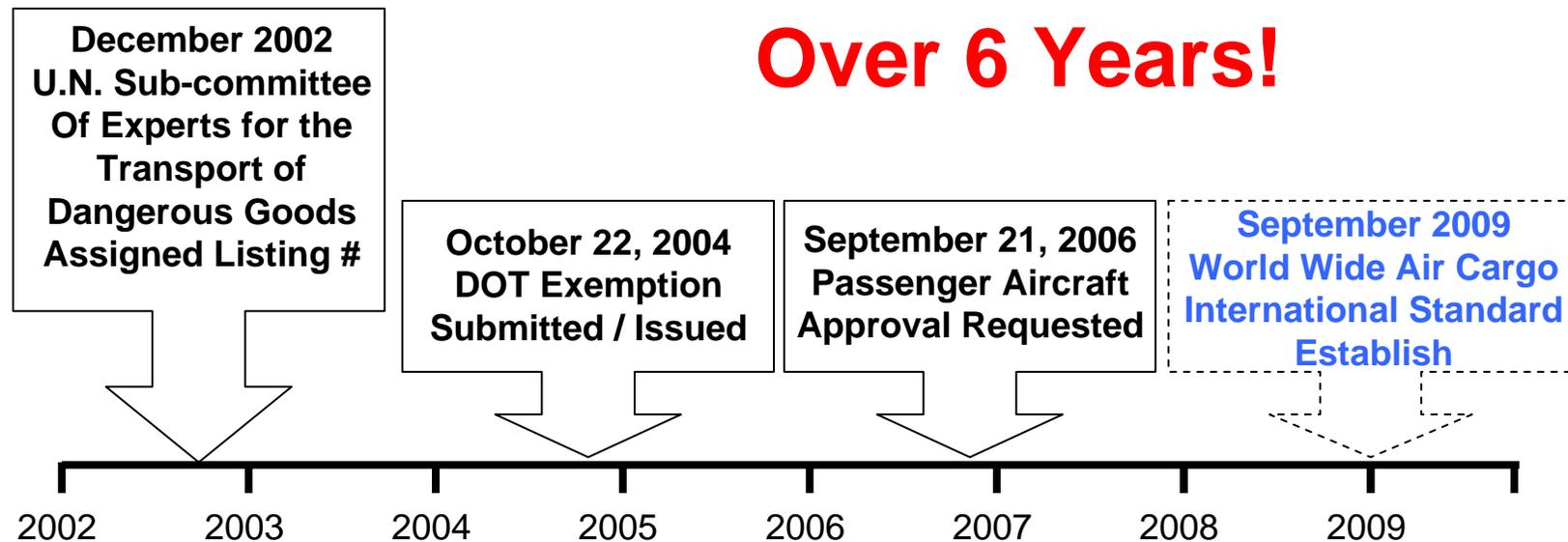
International Air Cargo

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.