



Emerging Electric Technologies: Next Big Ideas

Ellen Petrill

Senior Program Manager

2012 Market Transformation Symposium

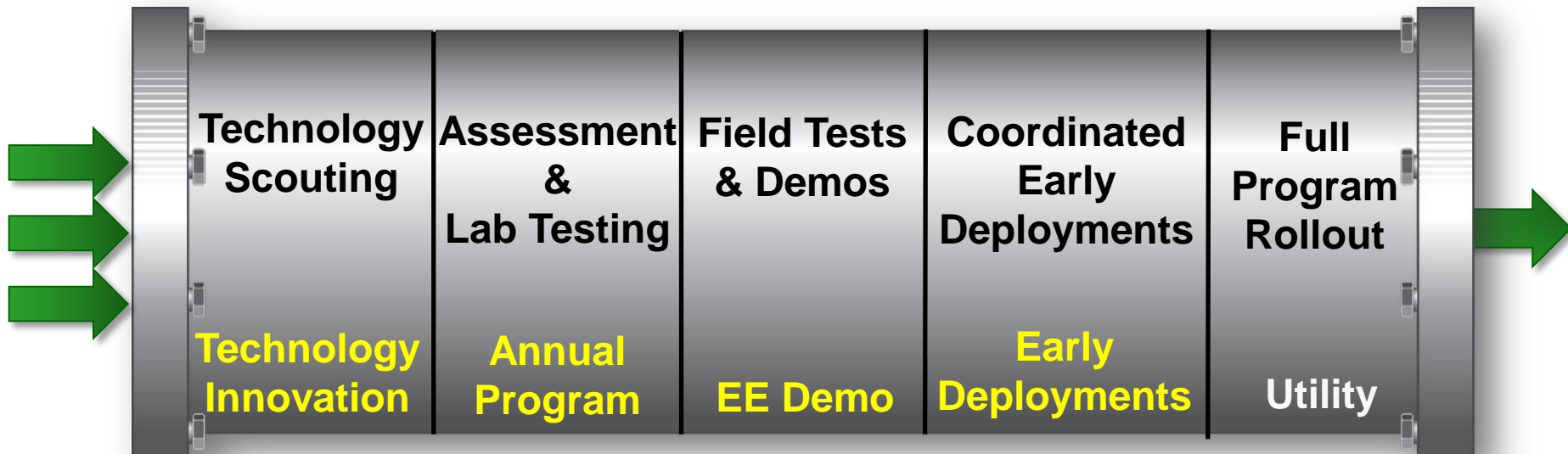
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Contents

- EPRI EE Technology Development Pipeline
- Technology Readiness
- Technologies
 - Lighting
 - Space conditioning
 - Electronics

EPRI EE Technology Development Pipeline

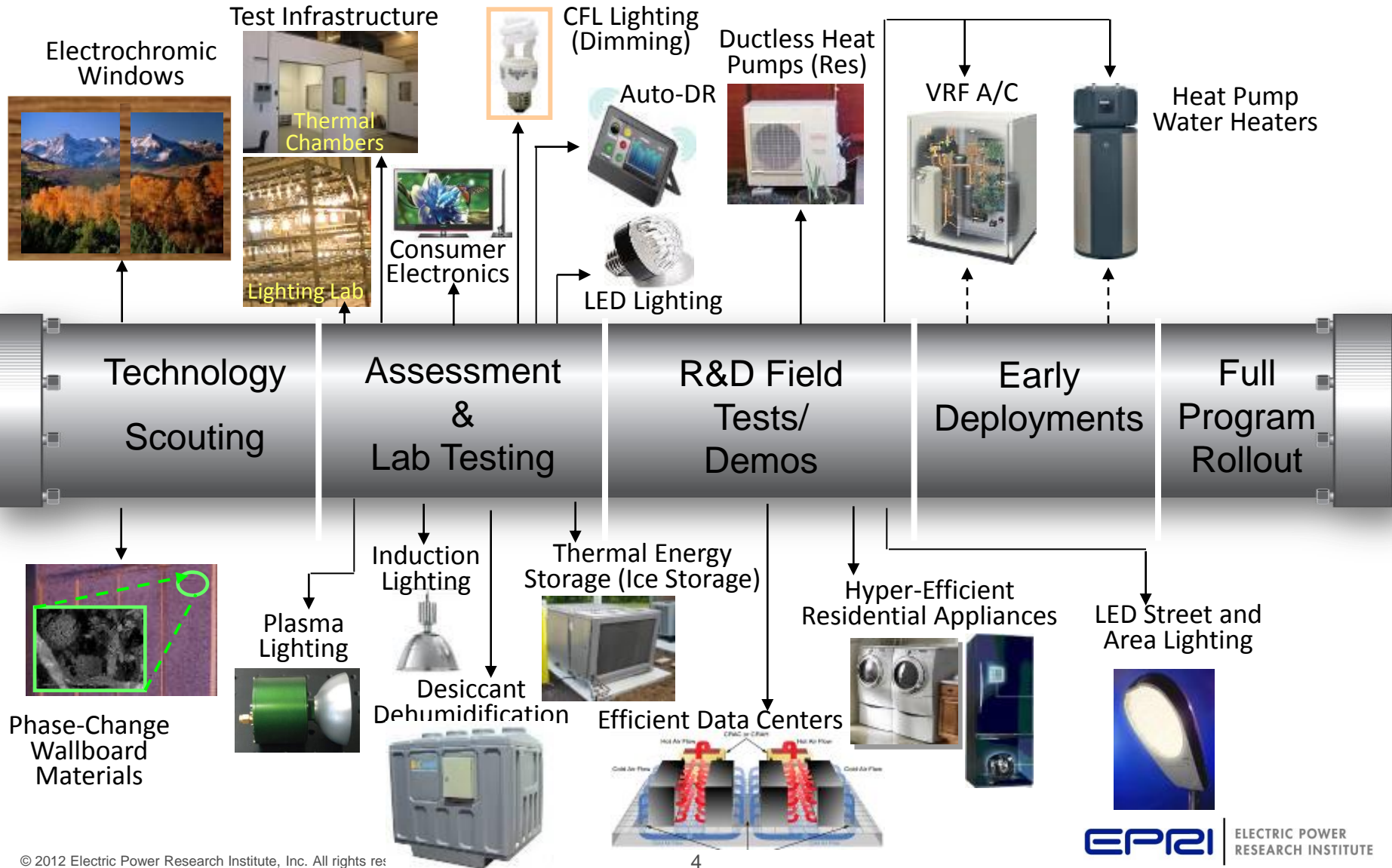
Accelerating Readiness of Emerging Efficient Technologies



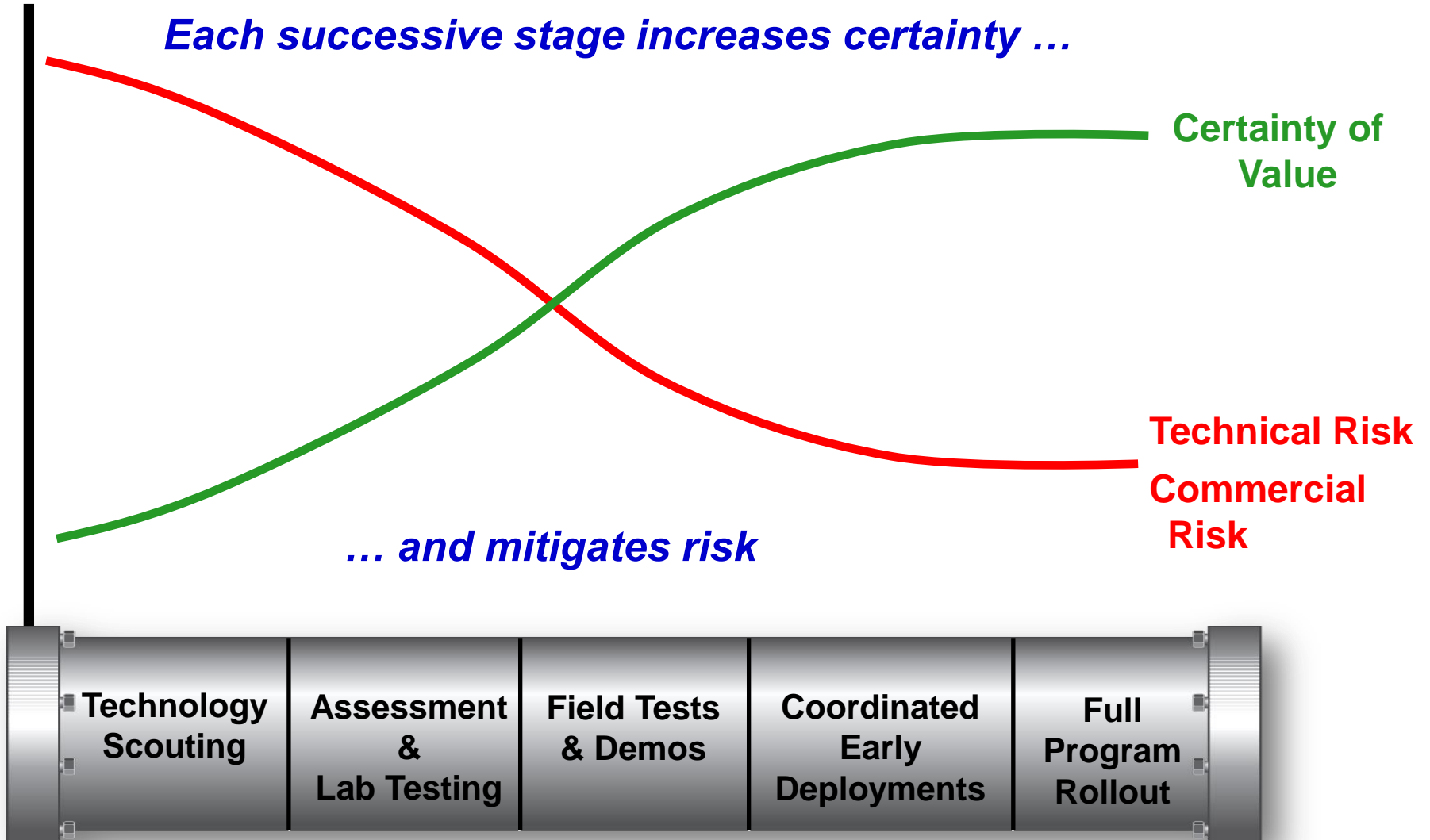
*Propel EE Technologies to
Mainstream Utility Programs*

EPRI Energy Efficiency Technology Pipeline

Sampling of EE Technologies Under EPRI Evaluation



Technology Evolution through the Pipeline



Technology Readiness Criteria

- Value
 - Energy and demand savings
 - Consumer benefits
 - Connectivity
- Technical Risk
 - Functional performance, reliability
 - Grid compatibility
 - Environmental/health & safety
- Commercial Risk
 - Cost
 - Consumer interest
 - Market supply strength

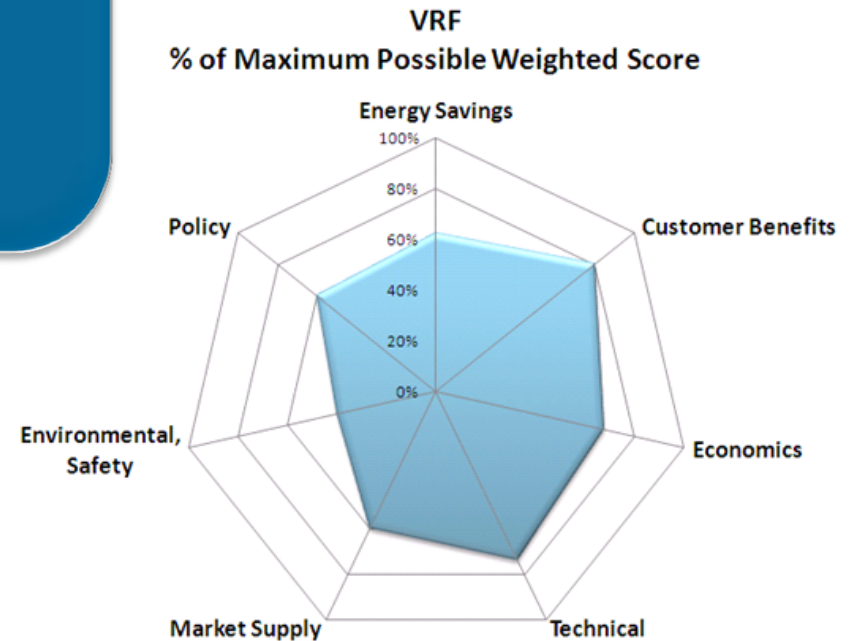


Technology Readiness Qualification

Program Readiness: Required Criteria

- Deemed/calculated energy savings
- Economics - line of sight to acceptable TRC & payback
- Positive adoption experience
- Supply chain - positive progress

Scored Criteria









Lighting: Technologies in EPRI's Lab in 2012

Advanced lighting technologies:

Fluorescent, halogen, high-intensity discharge (HID), new generation incandescent, induction, LED, plasma






Categories

Residential Screw In	Residential / Commercial Specialized	Office	Assembly / Manufacturing	Warehouse / High bay	Unique Technology
					
72W Eco Halogen	Architectural LED	LED Panels	Linear LED	Induction High Bay	Unique LED Screw In

Lighting is competitive: new products come in every month!

Lighting: Controls in EPRI's Lab in 2012

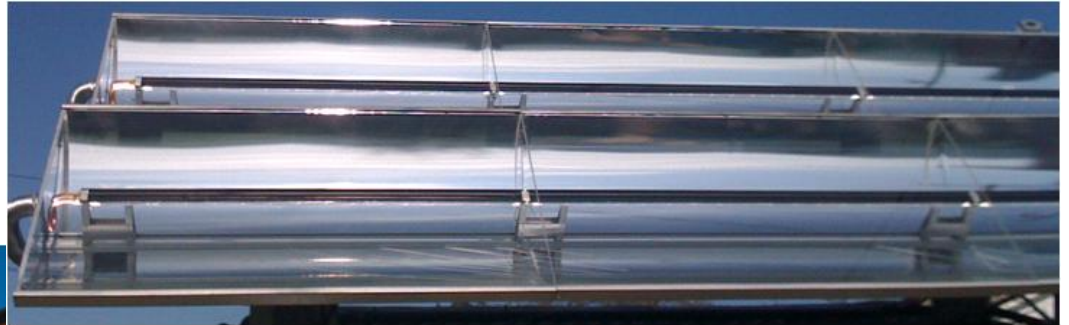
Categories

Residential	Commercial New Install	Commercial Retrofit	Commercial Add On	Unique Control Technologies
				
Add On Motion Socket	Power Line Carrier	Wireless Building Control	Motion	Zero Power Controls

How lighting is controlled will bring new efficiency opportunities

Lighting: Daylighting in EPRI's Lab in 2012

- Solar concentrators
- Light pipes

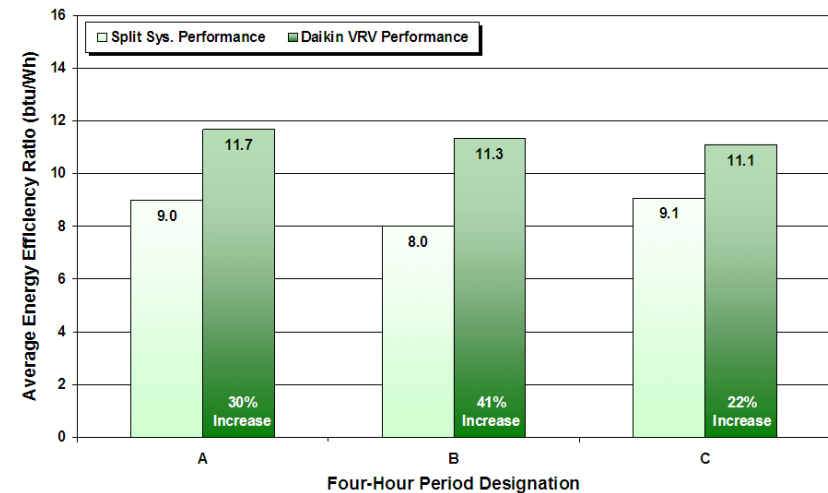
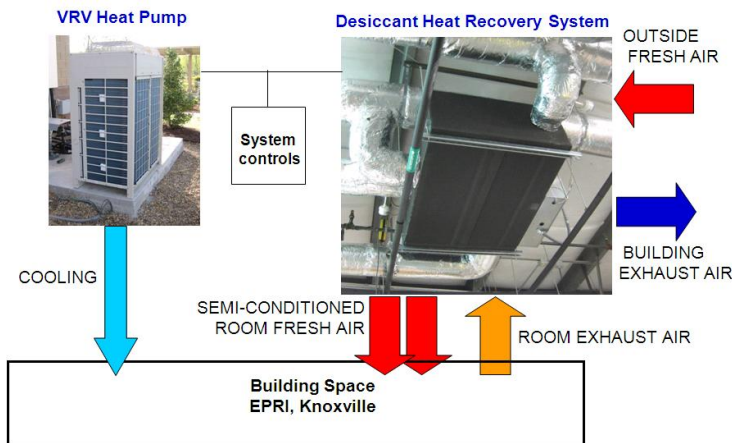


Daylighting, advanced lighting technologies, and controls offer the next emerging efficiency opportunities

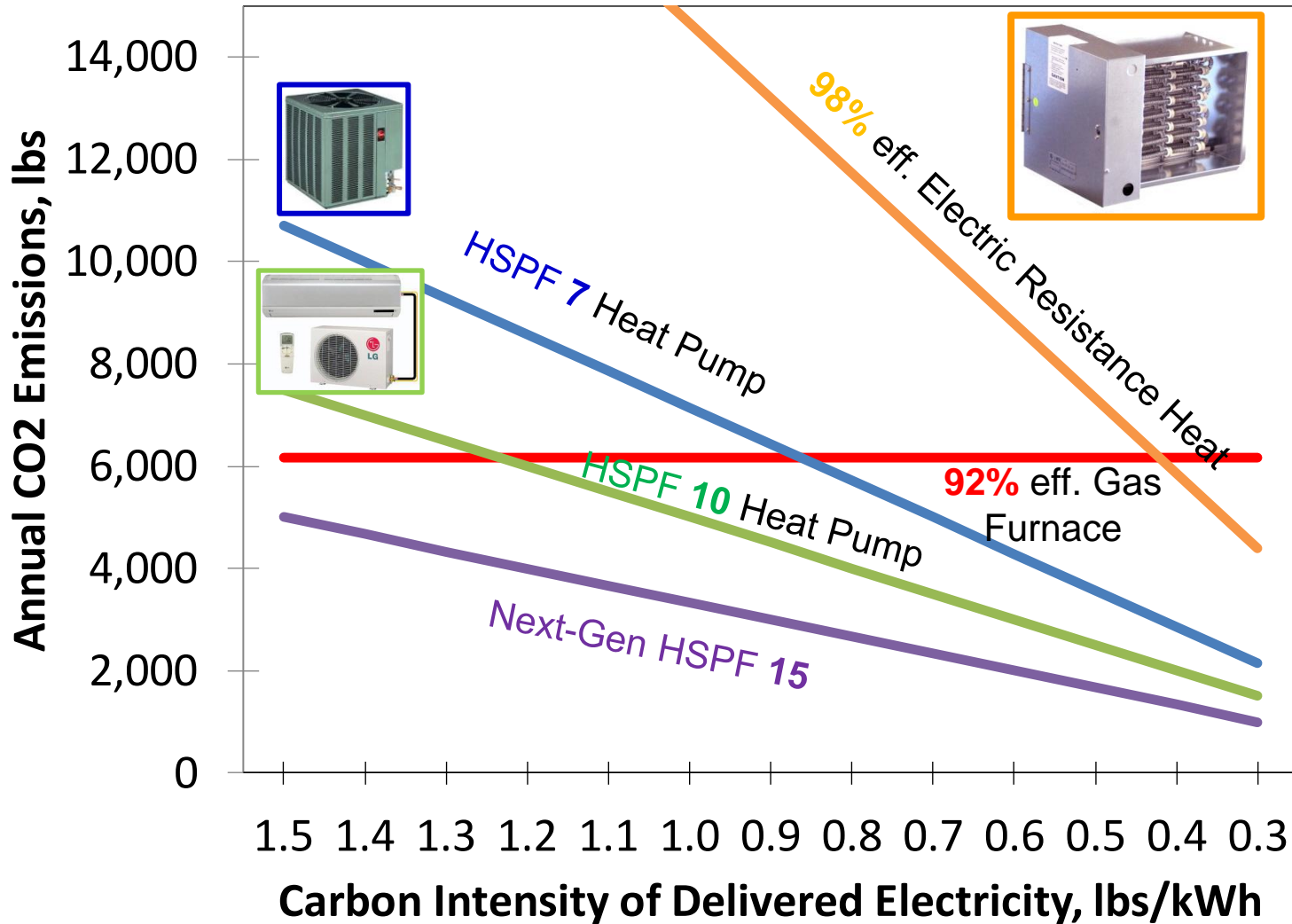
Space Conditioning

- **Heat pumps** for heating and cooling
- Efficiency boosters:
 - Variable capacity
 - Pre-cooling
 - Dehumidification
 - Ground source

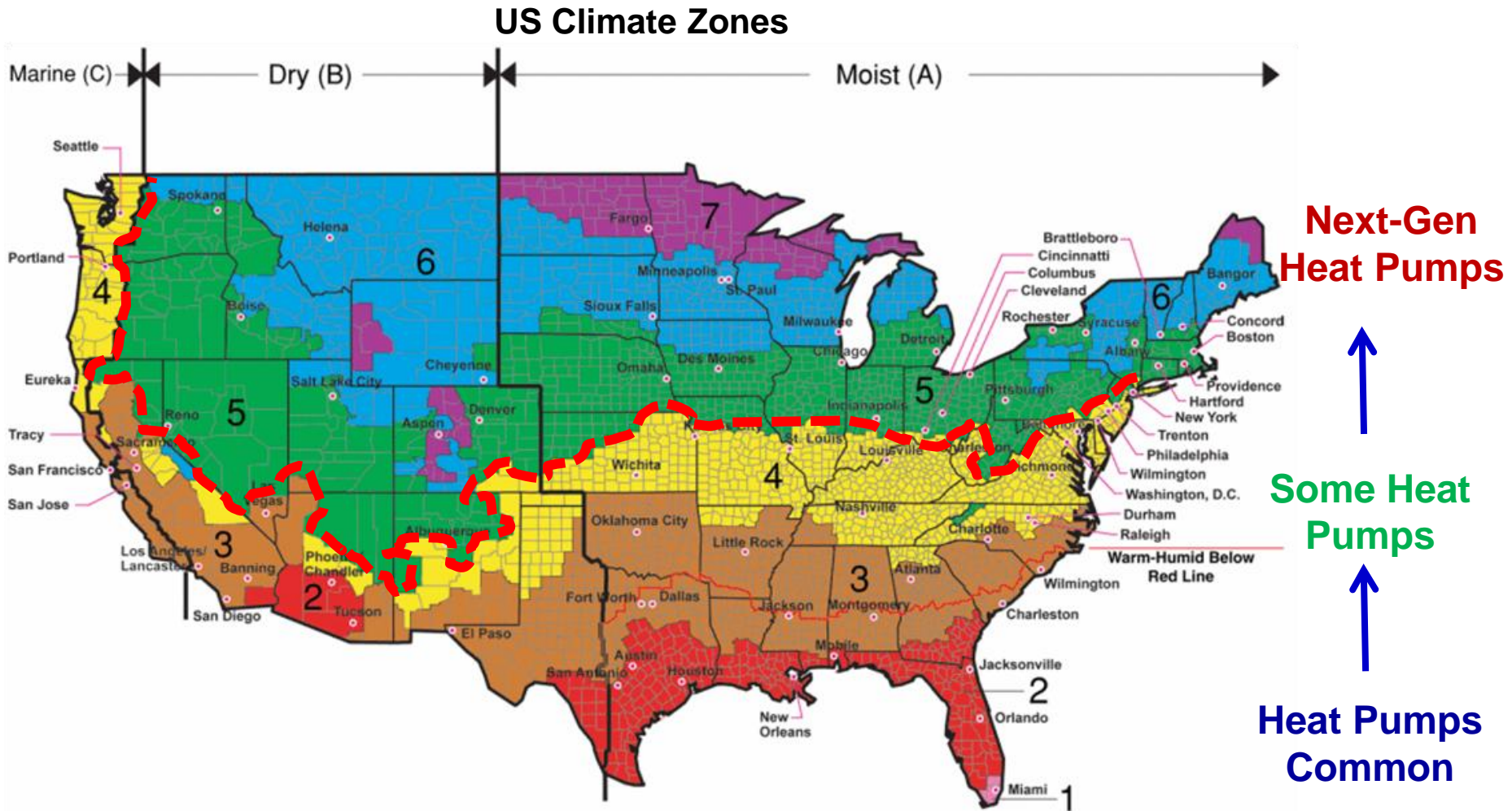
VRF for Commercial Use



The Decreasing Carbon Footprint of Future Heat Pumps



Heat Pumps Moving into Colder Zones



All of Alaska in Zone 7 except for the following Boroughs in Zone 8: Bethel, Dellingham, Fairbanks, N. Star, Nome North Slope, Northwest Arctic, Southeast Fairbanks, Wade Hampton, and Yukon-Koyukuk

Zone 1 includes: Hawaii, Guam, Puerto Rico, and the Virgin Islands

Electronics: DC Microgrids for Energy Savings and More...

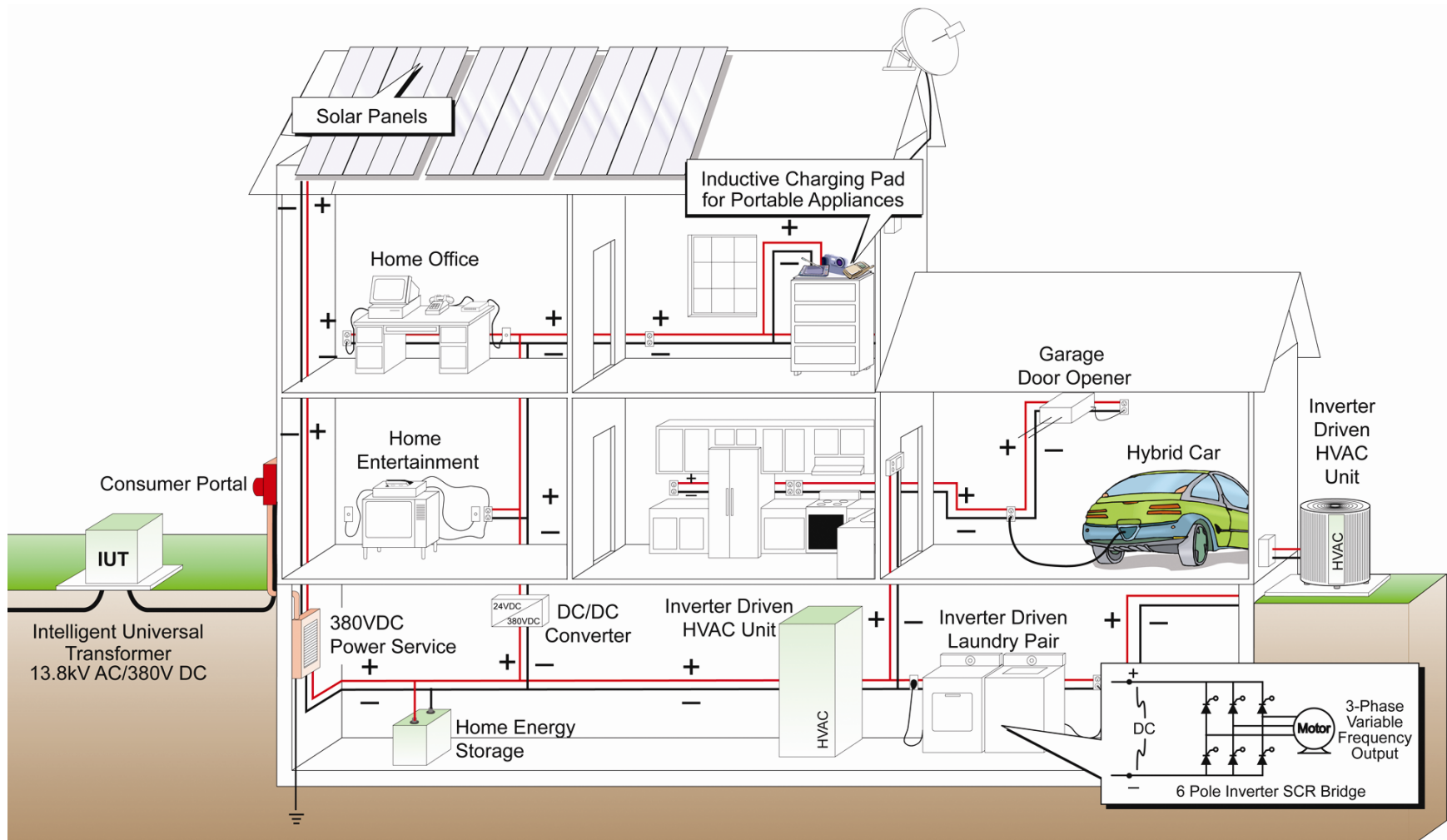
- DC vs. AC
 - Reduces conversion losses
 - Increases reliability
 - Decreases footprint
 - Improves power quality
 - Integrates with renewables and storage
- Data centers, then commercial buildings...

Duke Energy 380VDC
Data Center Demo



Worldwide DC Field Trials

DC-Powered Home – Potential Future Reality



So What Are Next Big Electricity Ideas?

- Readiness requires energy savings **and** customer benefits
- Lighting: Automate controls of advanced electronic lighting with daylighting
- Space conditioning: Heat pumps with efficiency boosters
- Electronics: Direct current
 - Now - Data centers
 - Future
 - Commercial buildings
 - Homes

Together...Shaping the Future of Electricity