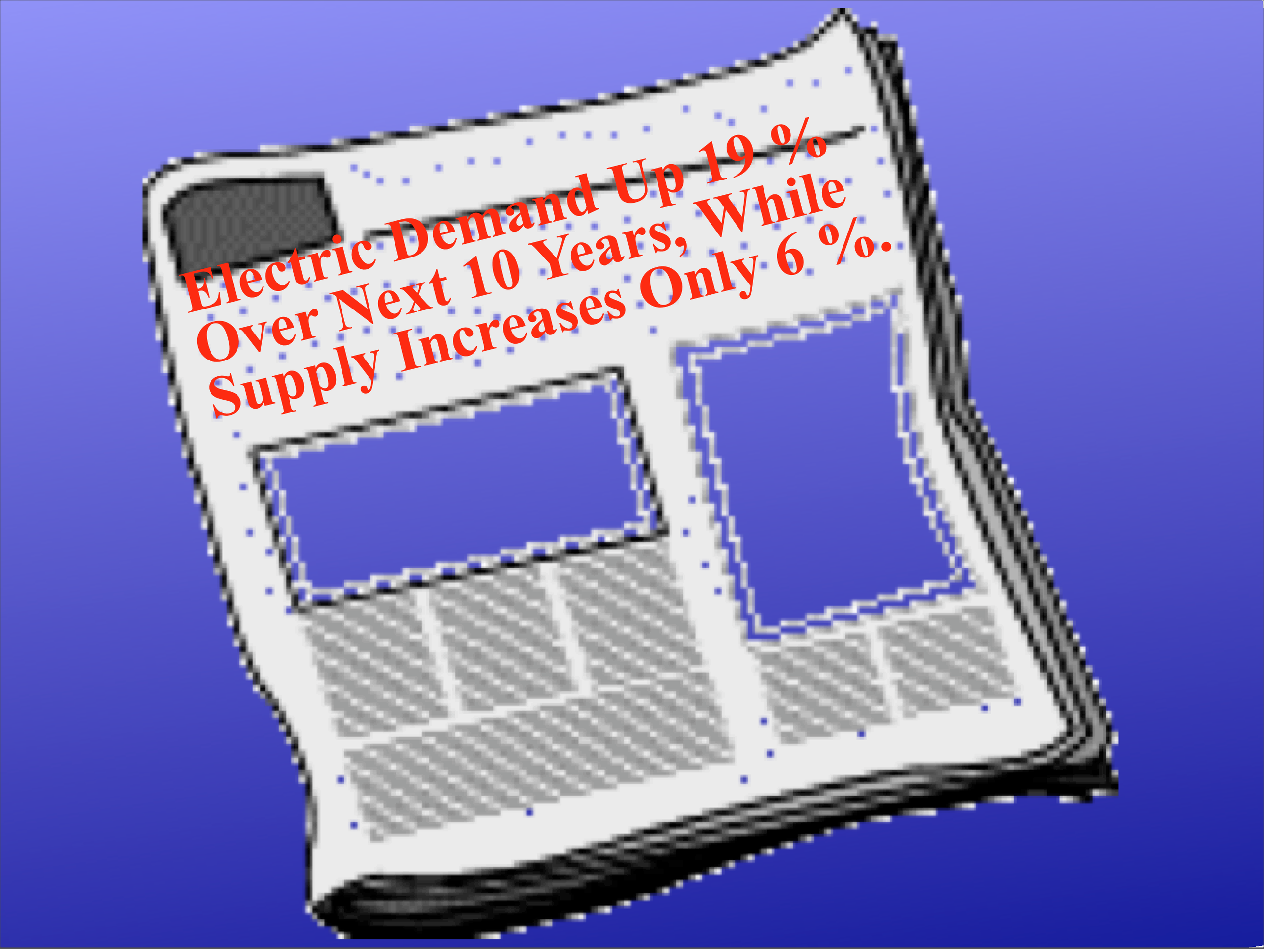
DEMAND RESPONSE

2007 Second Annual IRC Board Conference

Jon Wellinghoff, Commissioner
Federal Energy Regulatory Commission
May 24, 2007

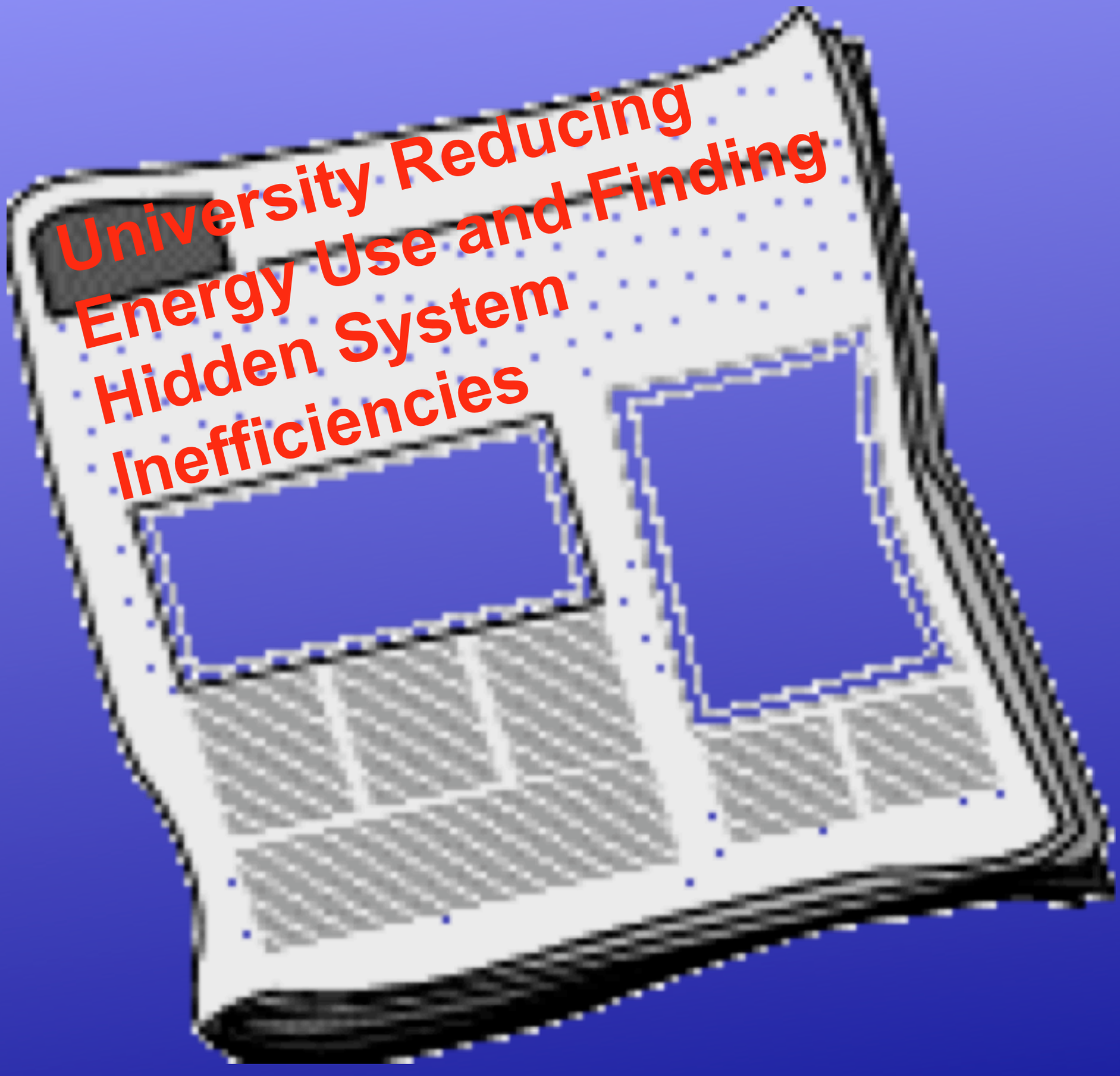

Gas Prices Near
Historic High

Households Fill With "Connected" Electronic Equipment


Electric Demand Up 19 %
Over Next 10 Years, While
Supply Increases Only 6 %..

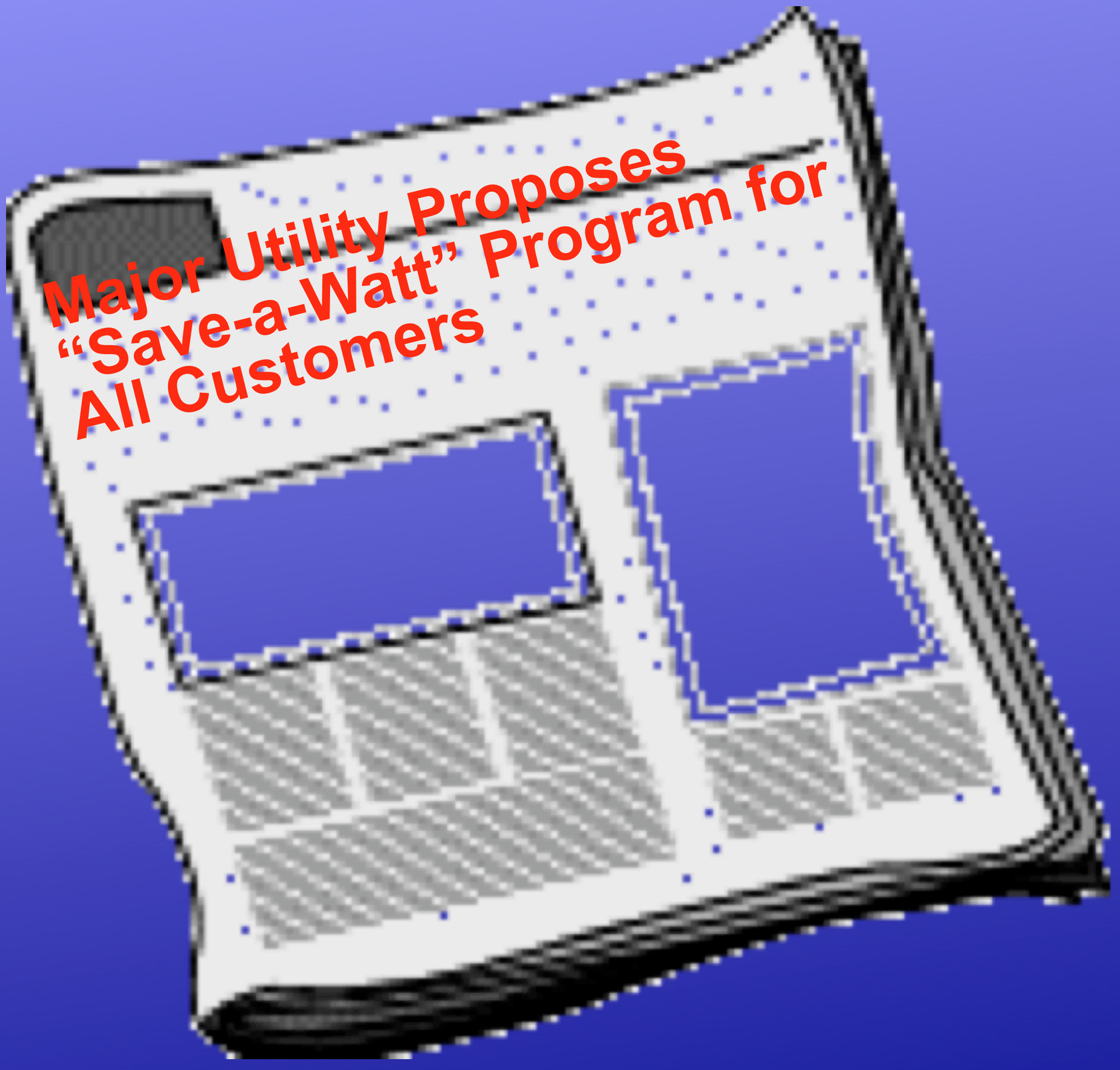
Electric Generation Prices Rise With Price of Natural Gas

Global Climate Change Threatens Coastal Cites

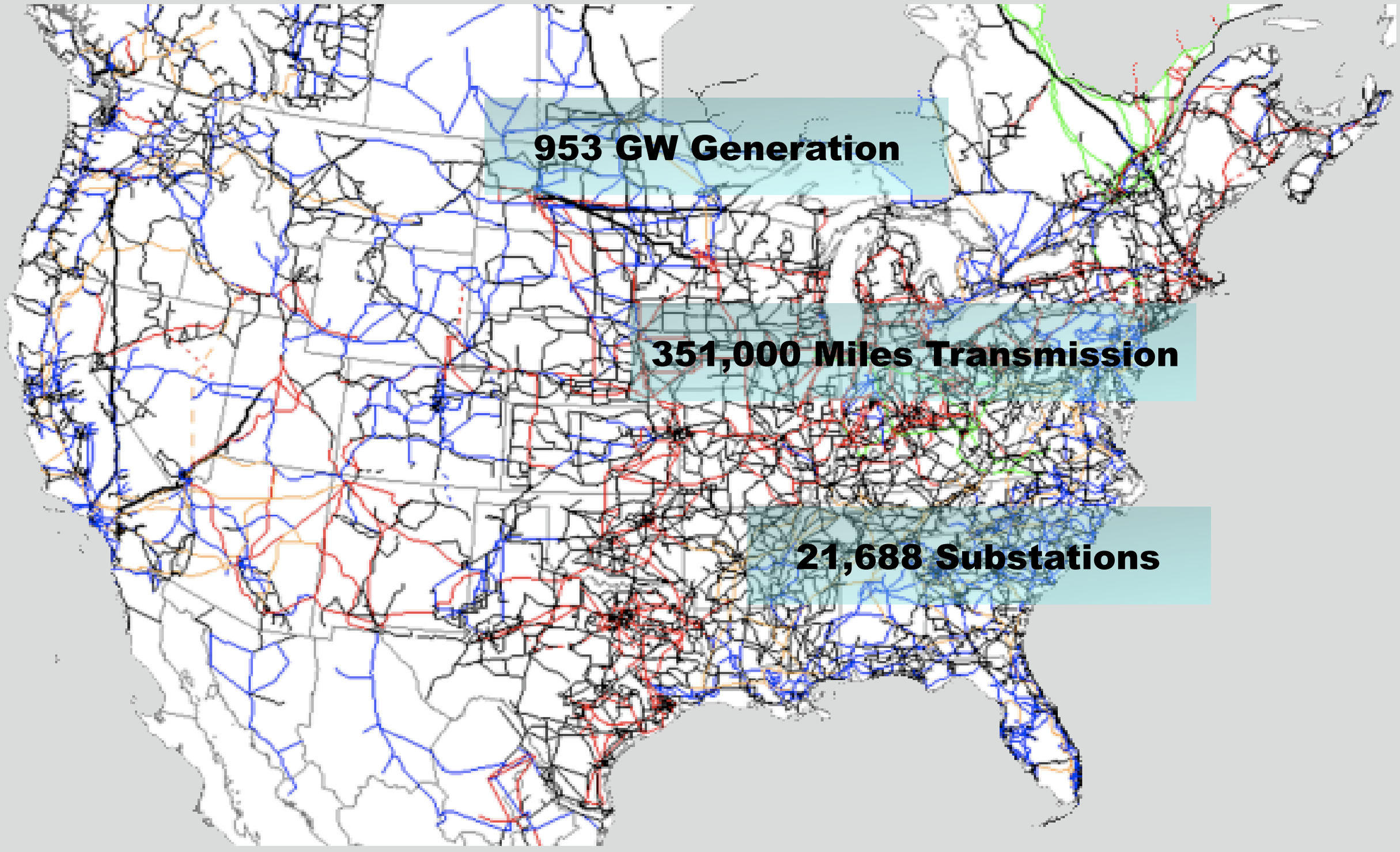

University Reducing
Energy Use and Finding
Hidden System
Inefficiencies

Best Buy to Sell "Digital Home in a Box" to Control Energy Costs

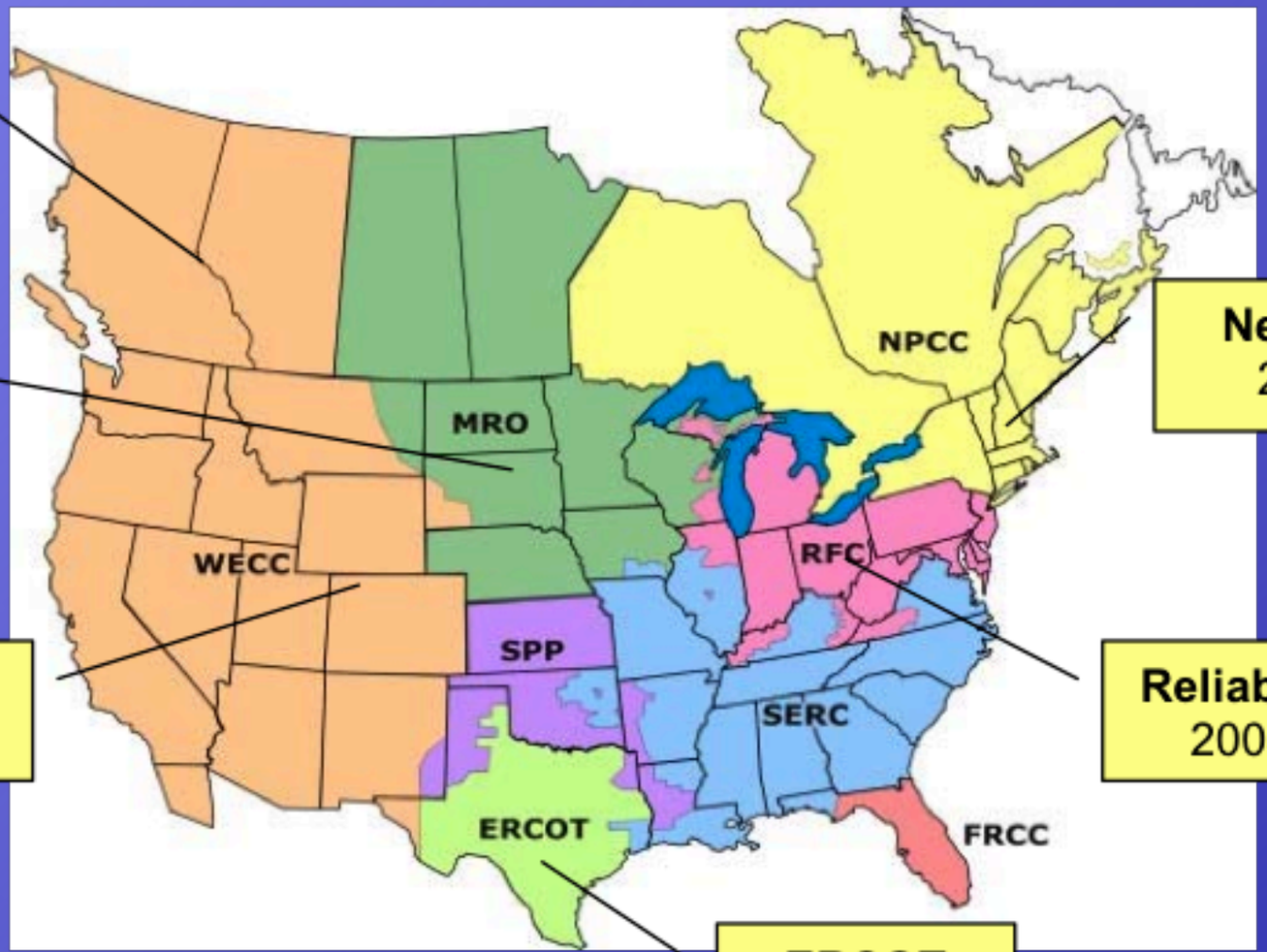
Major Utility Proposes "Save-a-Watt" Program for All Customers



The World's Most Complex Machine



Electricity Margins Projected Below Minimums



WECC Canada
2008/2009

MRO
2009/2015+

Rocky Mtn
2007/2015+

New England
2009/2011

Reliability*First*
2008/2013

ERCOT
2008/2013

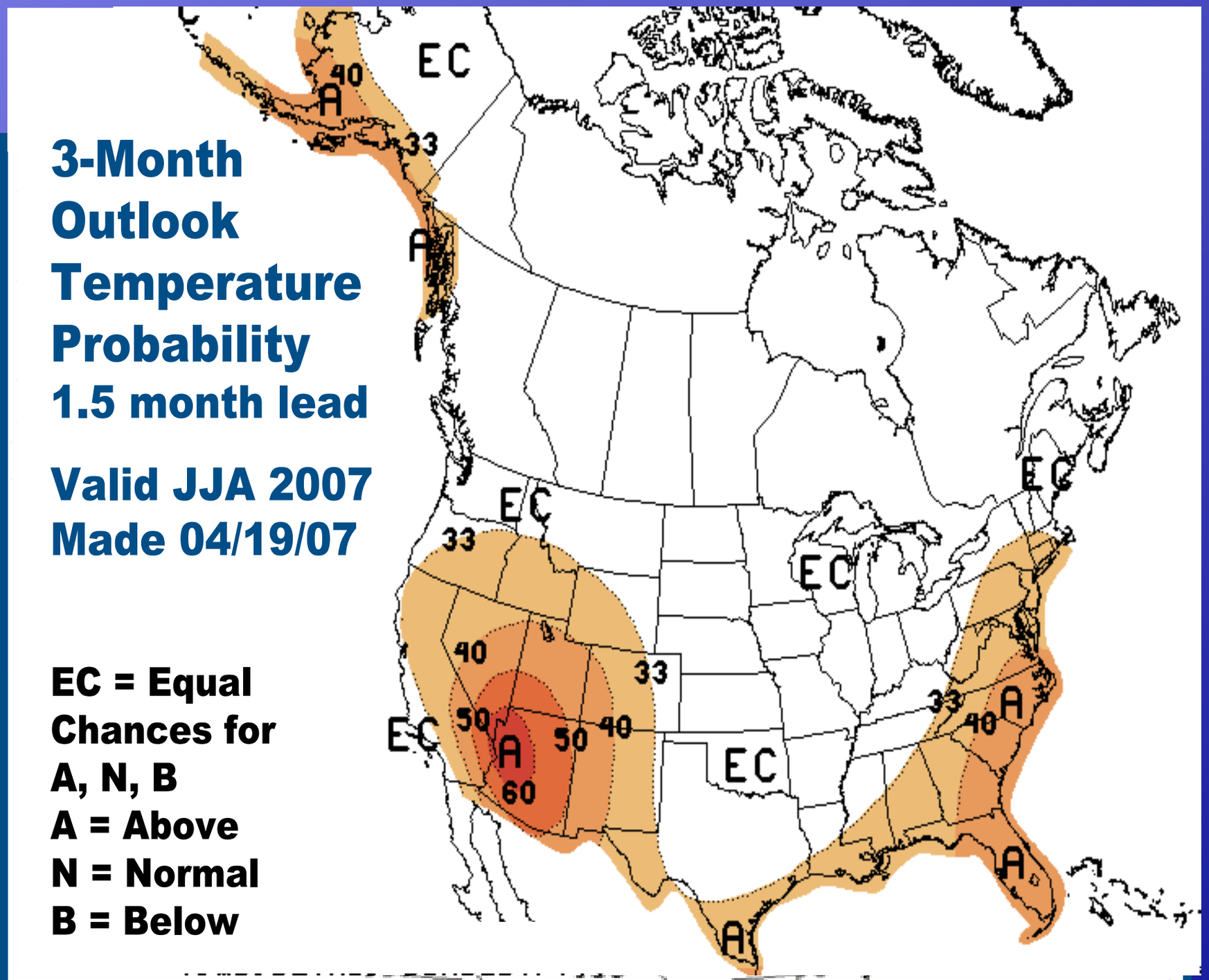
Areas Needing Additional Resources
XXXX/YYYY – 1st year additional resources needed
XXXX – beyond current projections
YYYY – beyond uncommitted resources

Current NOAA Forecast
Wide-spread Summer Heat

3-Month Outlook Temperature Probability
1.5 month lead

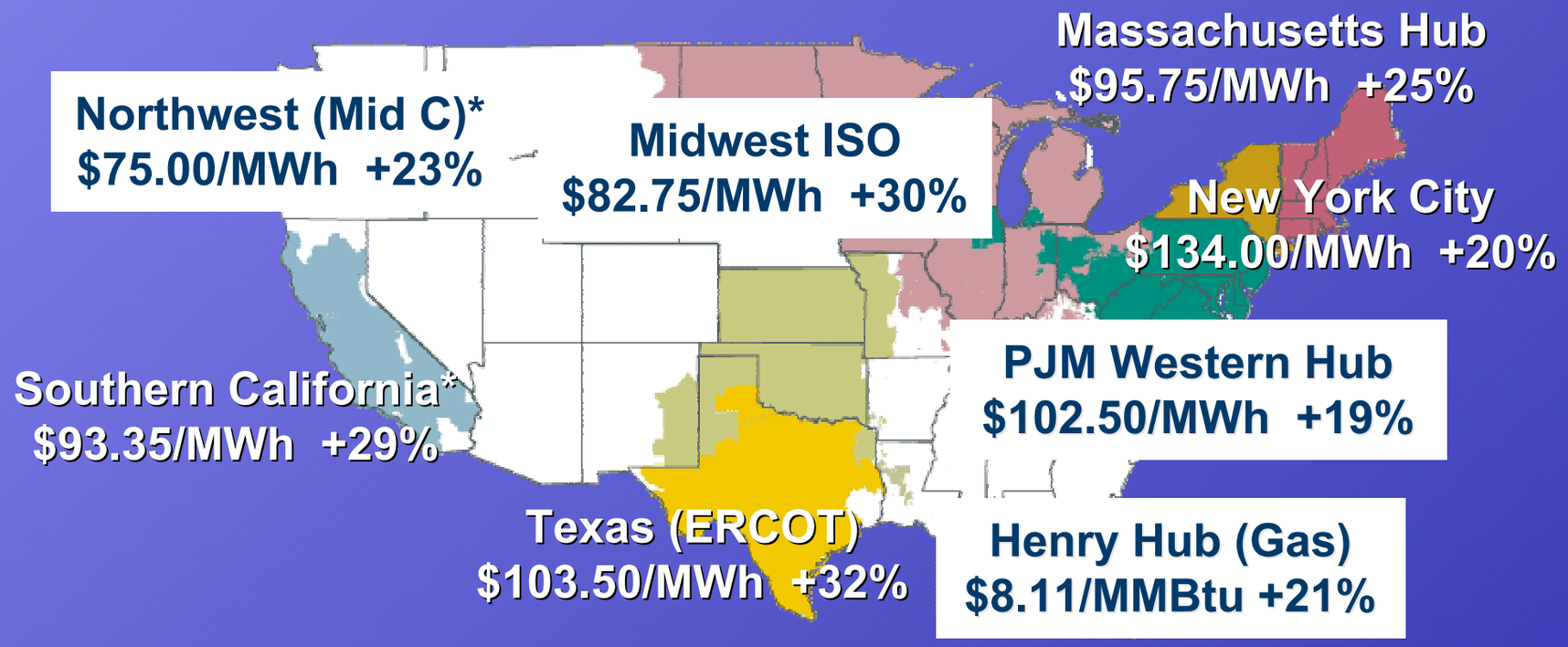
Valid JJA 2007
Made 04/19/07

EC = Equal Chances for A, N, B
A = Above
N = Normal
B = Below



Summer 2007 Forward Prices

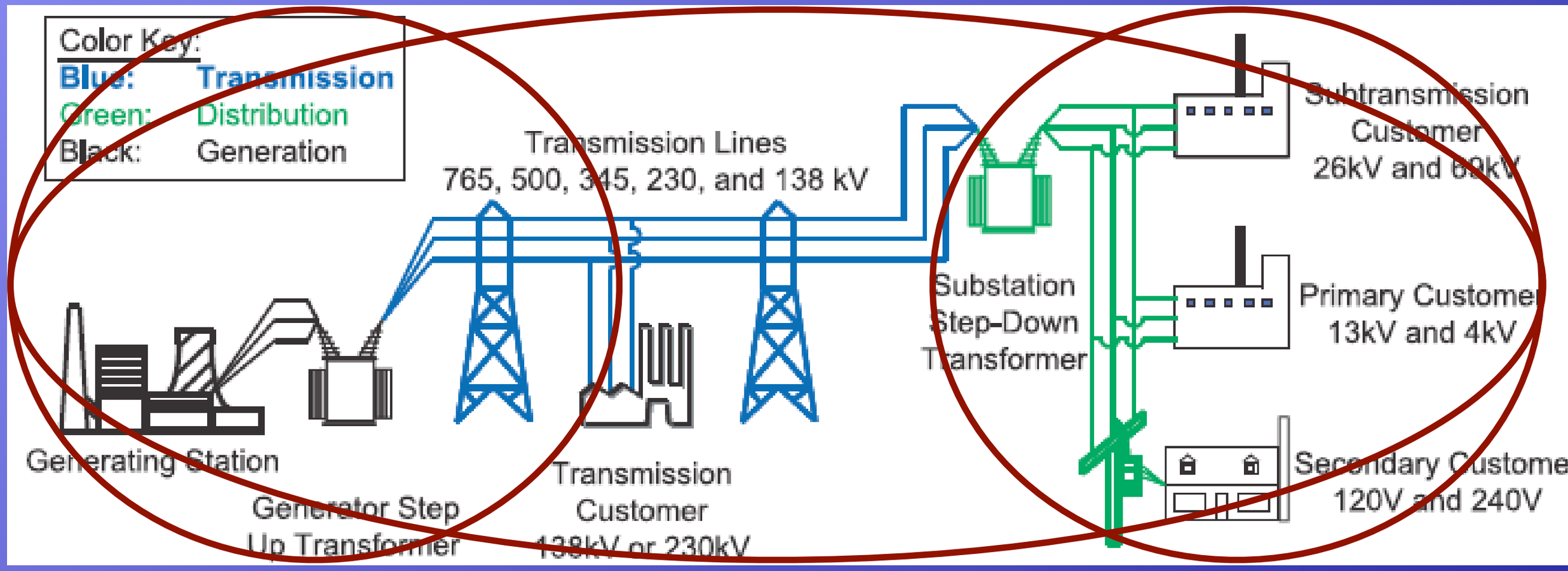
Now Higher Than Summer 2006 Prices



• Western prices are for 3rd quarter.

Sources: Platts for forward electricity prices for July and August 2007, NYMEX and ICE for gas. All prices effective 5/11.

Grid Efficiency- Physical & Regulatory Challenges



- **Limited Efficiency**
  - Carnot Cycle
  - Thermal Resistance
- **Structural Costs**
  - T&D Investment
  - Line & Transformer Losses

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Electric Loading/Planning Order

- **Distributed Resources as "First Fuel"**
  - **Demand Response** (Price Induced Change in Use of Energy that Reduces Load on Peak)
  - **Energy Efficiency** (From Generator to Load)
  - **Distributed Generation** (CHP)
  - **Distributed Renewables** (Geothermal, Wind, PV, Biomass, LFG, Small Hydro, In Stream Hydro, Wave Power)
- **Central Station Fossil Fuel Generation as "Second Fuel"**
  - **Natural Gas Combined Cycle**
  - **Coal w/Sequestration (Zero CO_2)**

Distributed Resources Make Sense as the "First Fuel"

- **Economic Benefits (Lovins- Small is Profitable)**
- **Reliability Benefits**
- **Siting Benefits**

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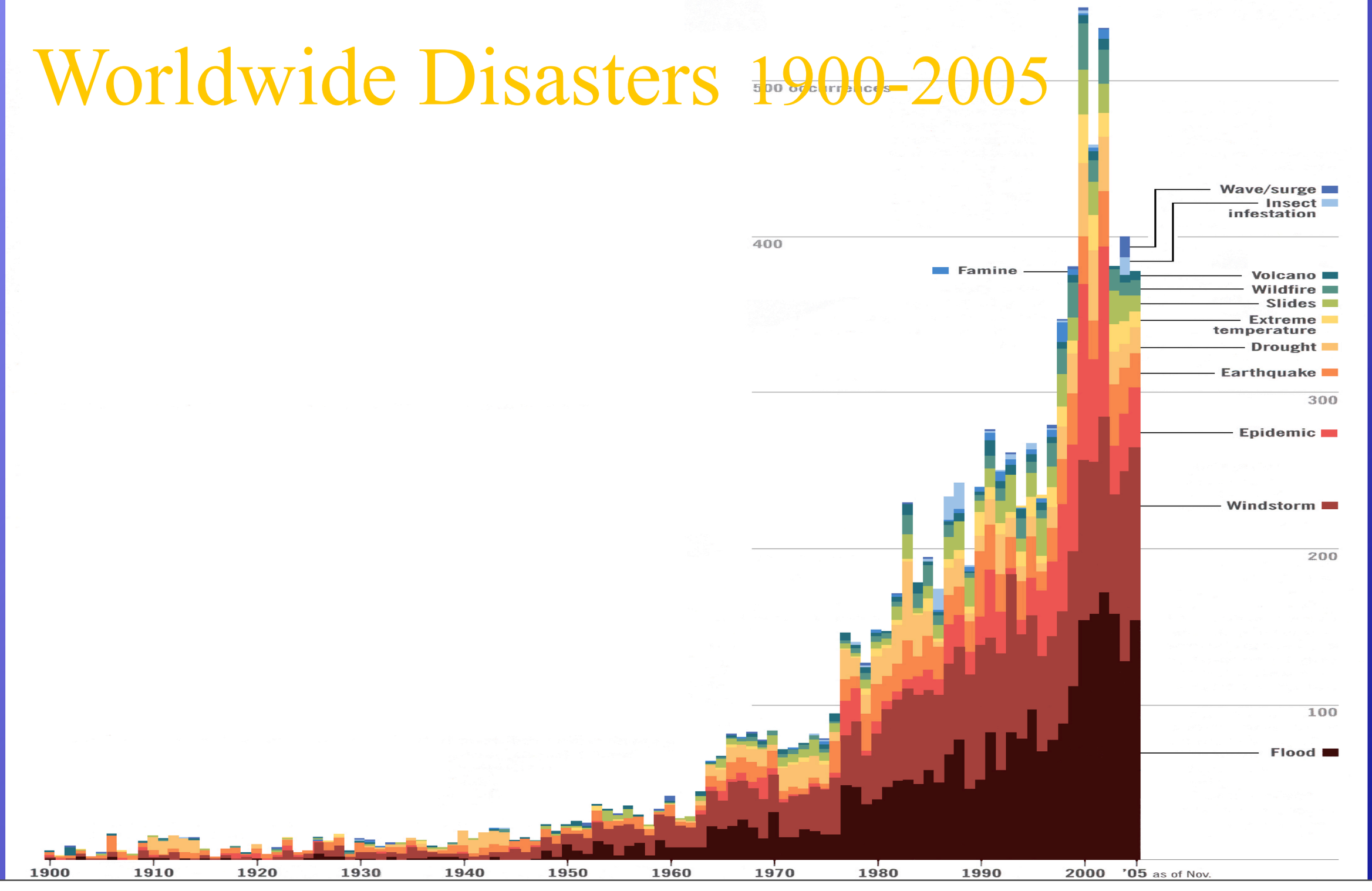
Distributed Resources Make Sense for Reliability & Security

Worldwide Disasters 1900-2005



Distributed Resources Are Under Utilized

- **Economic Barriers**
  - **Ratebase Recovery (30 yr) vs. Market Recovery (Next Quarter)**
  - **Exclusion from Markets**
  - **Split Incentives in Lease Space**
- **Institutional Barriers**
  - **Lack of Information**
  - **Lack of Industry Infrastructure**
  - **Regulatory & Industry Bias**

Demand Response- 2005 EPAct

- **"Timed Based Pricing & Other Demand Response Shall Be Encouraged"**
- **"Deployment of DR Technologies Shall Be Facilitated"**
- **"Unnecessary Barriers to Demand Response Shall be Eliminated"**
- **FERC- Section 1223 Directed to Promote Efficient Transmission Investments**
  - **List of 19 Items Includes DR/DG/Storage/ PV**

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FERC Action on Demand Response Wholesale Platform

- **Demand Response Should Be Allowed To Participate On a Comparable Basis- Order 890:**
  - **Energy Markets- Real Time and Day Ahead**
  - **Capacity Markets**
  - **Provide Ancillary Services**
    - **Operating & Spinning Reserves**
    - **Regulation & Frequency Response**
    - **Reactive Supply & Voltage control**
  - **Be Included in Regional Transmission Planning**
  - **Utilized for Maintaining Grid Reliability- Order 493**

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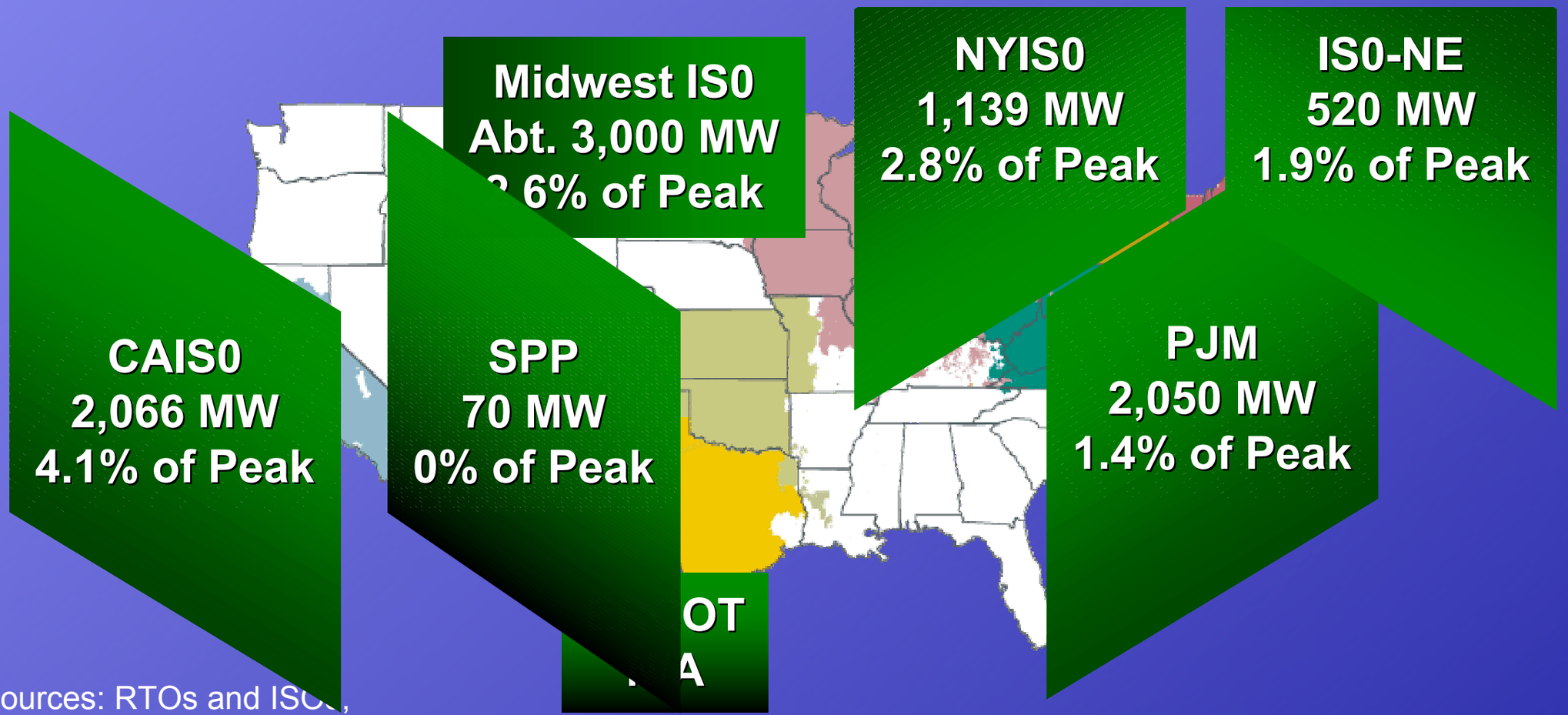
ISO Markets and Programs

Market Element	NYISO			ISO-NE			PJM			CAISO			MISO			SPP		
	H	O	I	H	O	I	H	O	I	H	O	I	H	O	I	H	O	I
Demand Response Market Participation:	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•
Emergency Situation DR Program	•			•			•							•				
Real Time DR Bids - Higher of Bid or LMP	•	•		•			•			•	•		•	•			•	
Day Ahead DR Bidding into Market	•			•			•	•			•			•				
Capacity Market DR Participation	•	•		•	•		•		•									
DR in Long-Term Tx Planning	•			•				•		•					•			
Ancillary Services DR Participation	•	•		•	•		•			•	•			•				
Reactive Supply & Voltage Control																		
Regulation & Frequency Response		•					•							•				
Energy Imbalances																		
Spinning Reserve	•	•		•			•			•	•			•				
Non-spinning (10 Minute) Reserve	•	•		•						•				•				
Long Term Supplemental (30 Minute)	•			•										•				
Generator Imbalances																		

H: History and in place
O: Open dockets and actions
I: Initiatives that are being discussed

Demand Response Critical in 2006

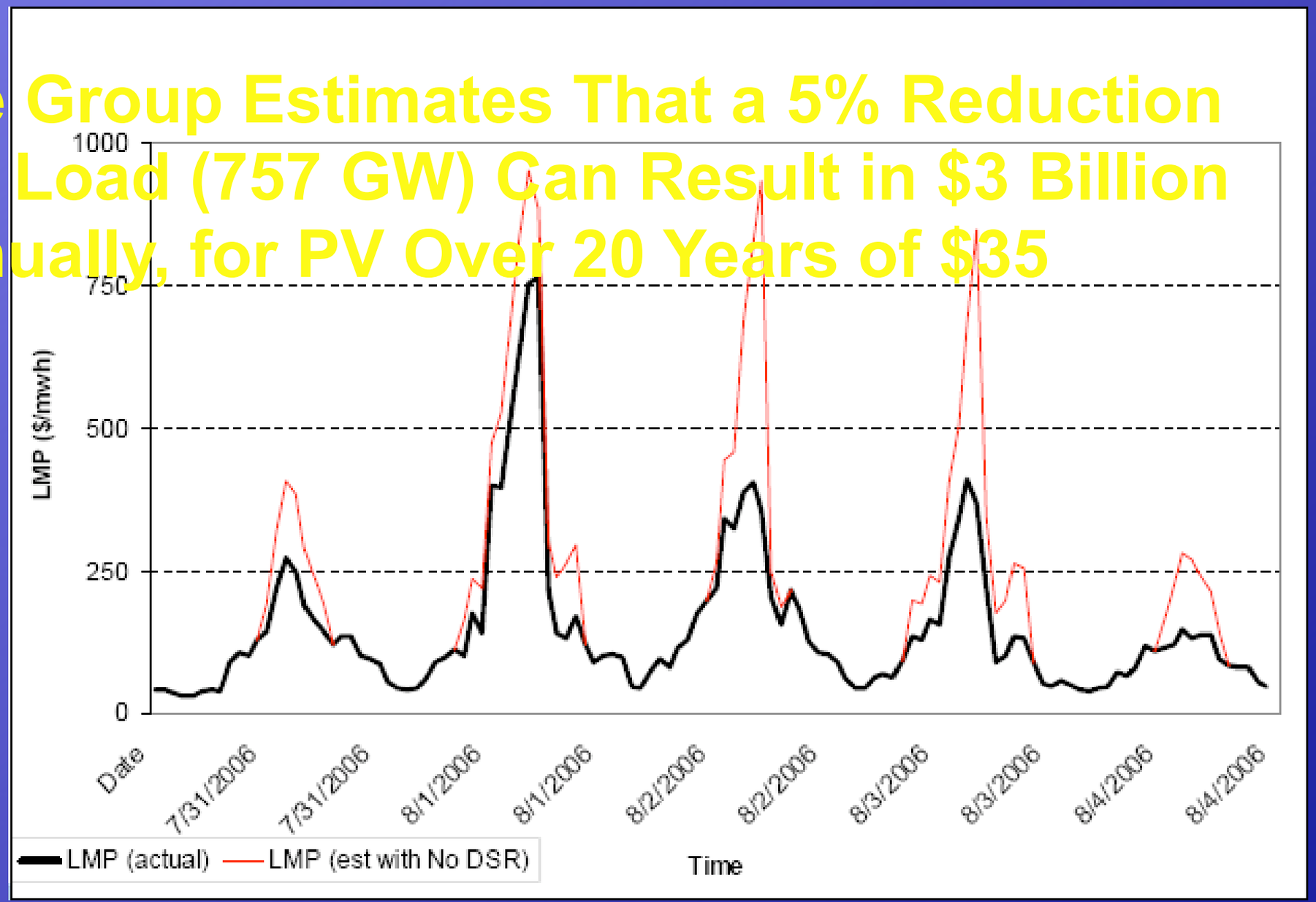


Sources: RTOs and ISOs, companies, PUCs and NERC

Demand Response Benefits

- **PJM Study Shows That a 3% Reduction in Demand of Top 20 Five-hour Blocks in 5 Mid-Atlantic States Could Save $280 Million per Year**

- **The Brattle Group Estimates That a 5% Reduction in Grid Peak Load (757 GW) Can Result in $3 Billion Savings Annually, for PV Over 20 Years of $35 Billion**



Customer Barriers to DR Participation

- **Regulatory**
  - **Wholesale Prices not Communicated to Retail Level**
    - **Lack of Hardware (Meters)**
    - **Lack of TOU Rate Structures**
  - **Wholesale Tariffs That Are not Resource Neutral**
    - **Bar Participation**
    - **Provide Reduced (Unfair) Compensation**
    - **Are Unavailable**
  - **Retail Customers Barred by State from Participation at Wholesale Level**
- **Non-Regulatory**
  - **Lack of Information**
  - **Financial / Operational Constraints**

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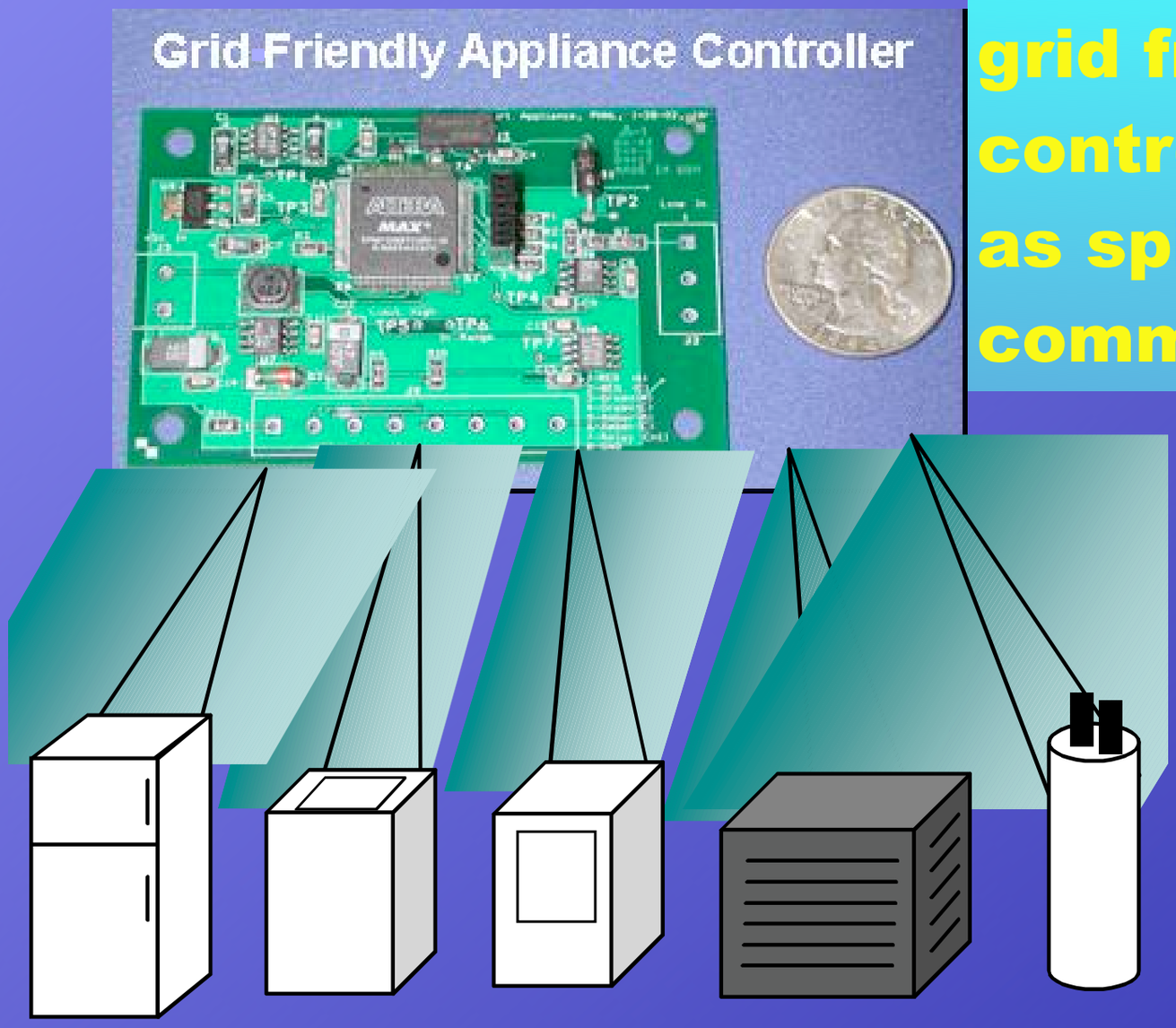
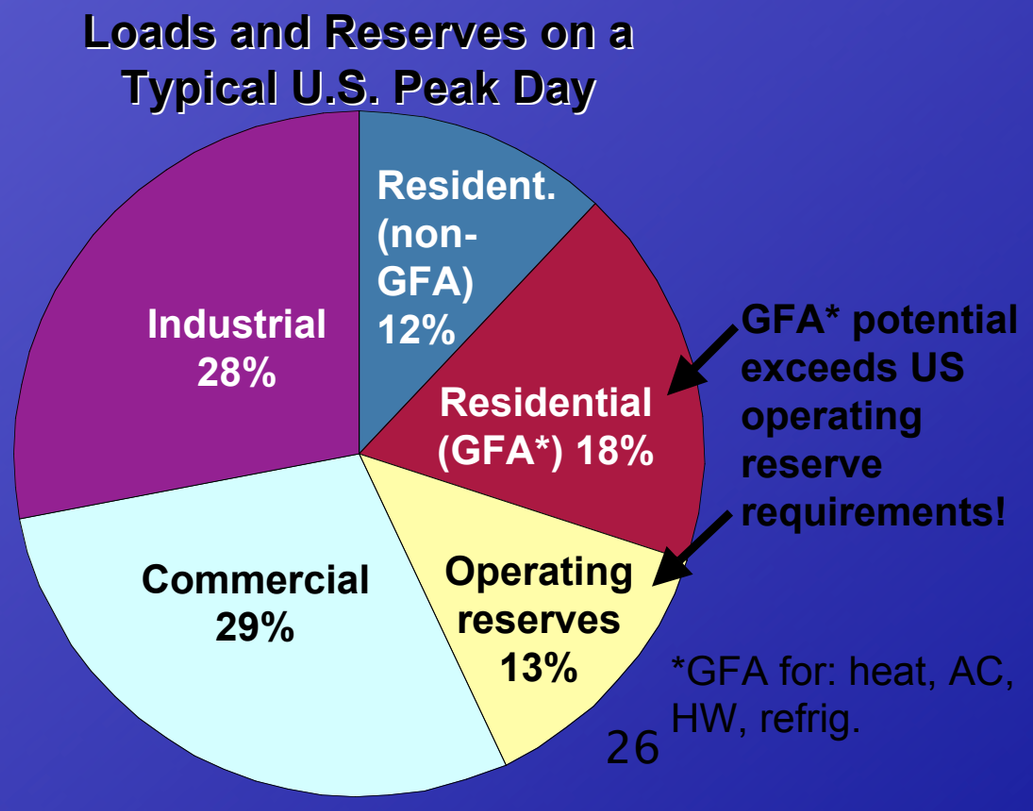
Economic Neutrality for Demand Response

- **Beyond- Energy, Capacity, and Ancillary Service Payments**
  - **Payments for Increasing Capacity or Reducing Congestion**
  - **Payments "As If" Demand Response Were a Transmission Investment**

Grid Friendly™ Appliances

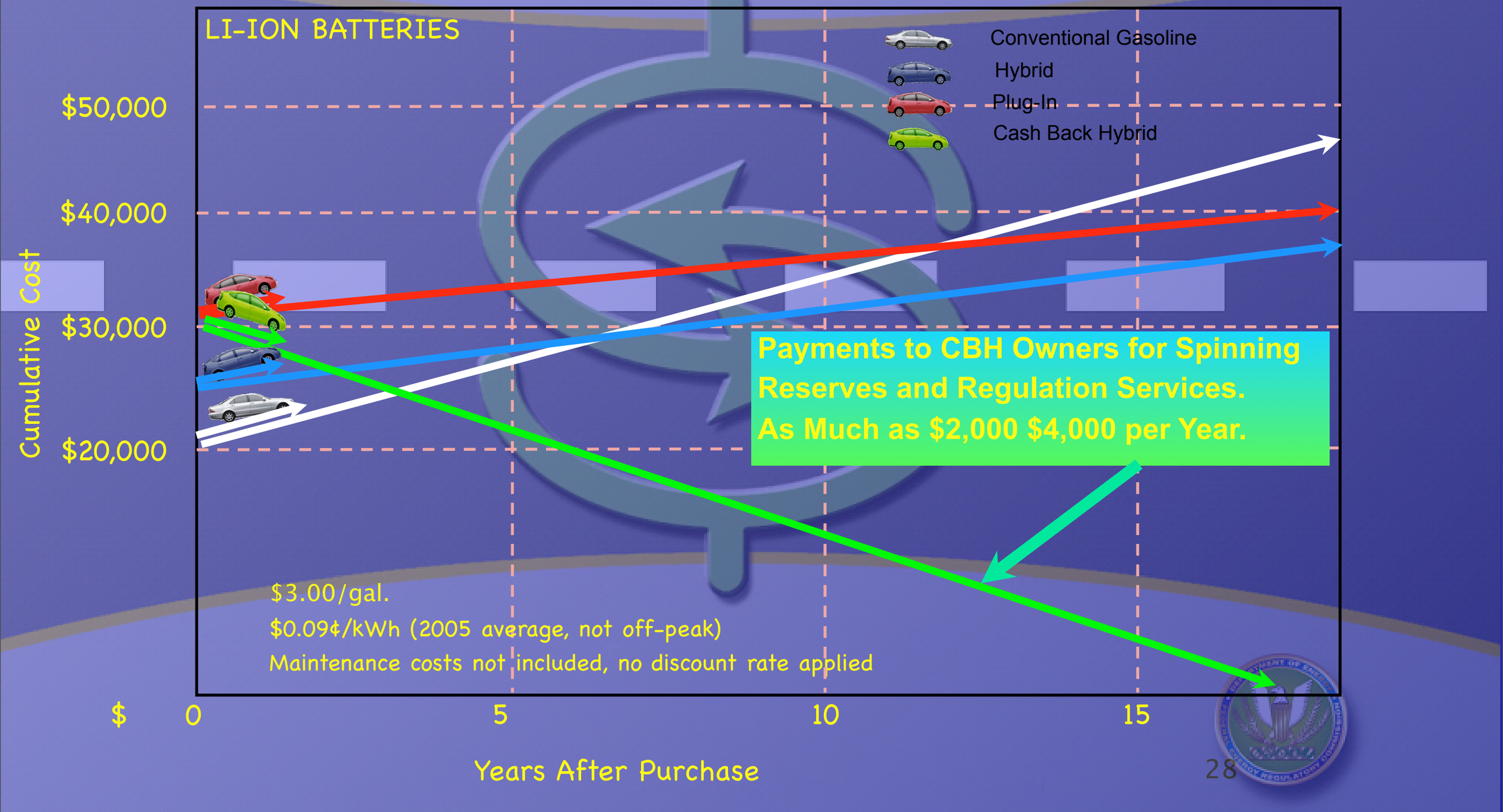


Grid Friendly Appliances sense grid frequency excursions & control region's appliances to act as spinning reserve – No communications required!



Advanced Demand Response

The "Cash Back" in CashBack Hybrid



CashBack Hybrid Electric System Benefits

- **Efficient Grid Management**
  - Ancillary Services (Spinning Reserve & Regulation)
  - Dispatchable Reactive Power
  - Peak Demand Services (Demand Response)
  - Reduced Operating and Planning Reserves
  - Distribution/Substation Level Support
  - Reduced Line Losses
  - Improved Power Plant Efficiency
  - Improved Load Factor
- **Storage & Integration of Renewable Power**
  - Wind & Solar
  - Load Following
- **Emergency Power Supply**
- **Electric Transit Power Support**

ISO/RTO Distributed Resources Optimization

- **Fully Integrate DR Into Markets**
  - DR Compete to Establish Market Clearing Price
  - DR Compete to Provide Ancillary Services
  - Comparable Payment for Comparable Service
  - Establish Interoperability Criteria, Communication, M&V, and Settlement Protocols to Facilitate DR Participation
- **Fully Integrate DR Into Planning**
  - Actively Seek DR Proposals
  - Request DR Estimates From Industry Providers
  - Use "Comparable" Data Sources for Forecasts
- **Actively Involve DR Providers in Stakeholder**

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ISO/RTO DR Optimization Challenge

- ★ **Examine Best Practices to Integrate DR Into Markets, Operations, and Planning**
- ★ **Fully Inventory Your Region's Configuration of Existing and Potential DR**
- ★ **Establish Goal of Performance Comparable in Function and Value to Best Practices for Distributed Resources in All Markets and Operations for:**
  - Market Access and Compensation
  - Communication and Interoperability
  - Interface with Retail Programs and State Policies
  - M&V
  - Incorporation into Planning Processes as Viable Compliments and/or Alternatives
  - Forecasting Impacts and Availability
  - Stakeholder Participation
  - Economic Comparability with Supply Side Resources

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Questions?