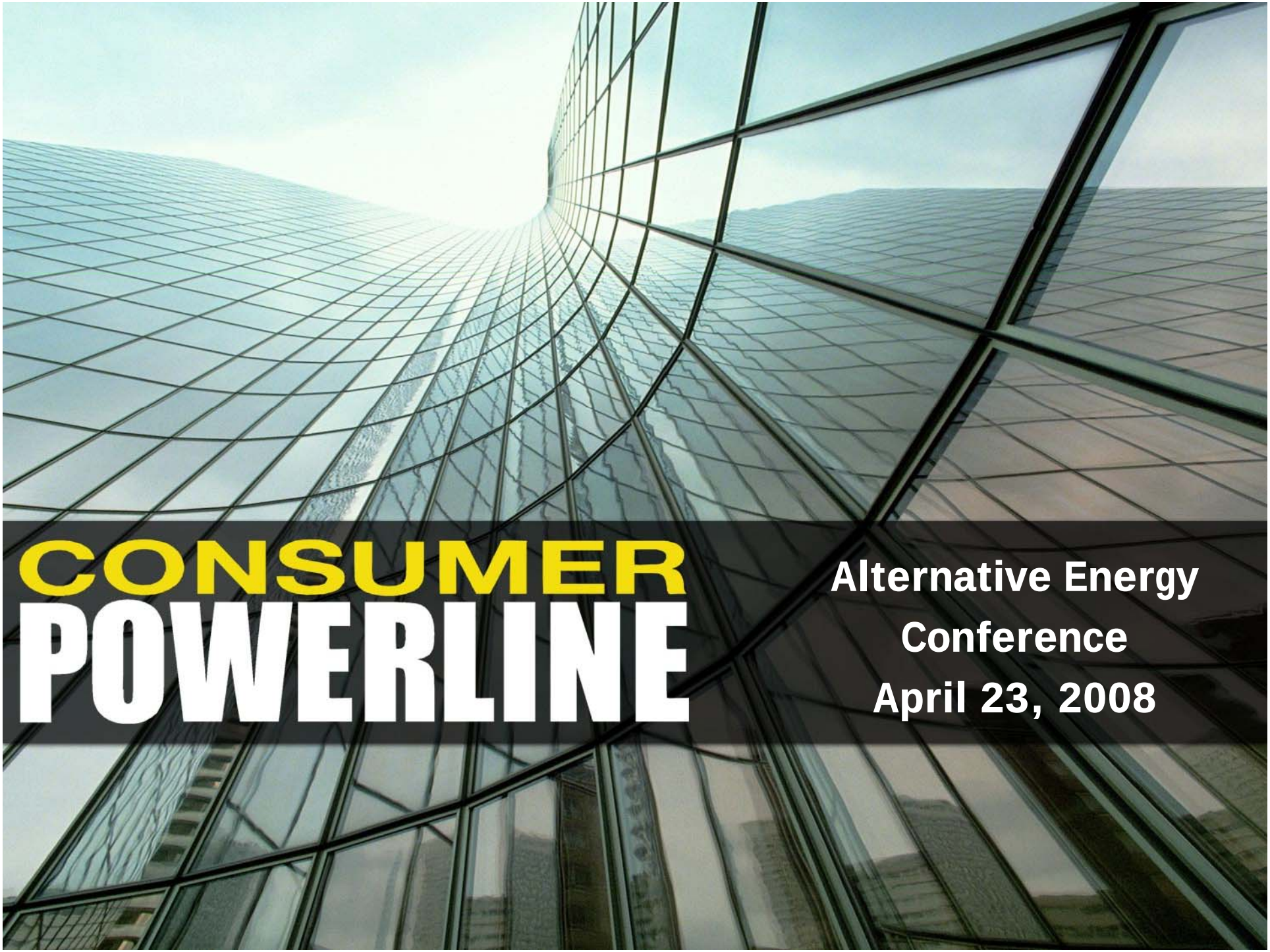
CONSUMER
POWERLINE
Alternative Energy
Conference
April 23, 2008

Demand Response and Energy Efficiency as Renewables

ConsumerPowerline - What We Do

ConsumerPowerline works with property and facility owners and operators to develop and implement integrated energy management strategies that:

- Reduce peak and on-going energy use
- Generate new sources of revenue from the energy markets
- Reduce on-going energy costs
- Secure the highest incentives for energy management
- Gain recognition for sustainable energy leadership

ConsumerPowerline – A Leader in Demand Response

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- Founded in 2000; financed organically thru 2007
- Received $20M+ in Series A Financing in 2007; lead investors are Expansion Capital, Bessemer Ventures
- Helped build DR markets throughout North America
- National leader/visionary in designing and developing new DR programs across the US
- Advocate for electricity end-users with ISOs / Utilities
- Active in New York, New England, Mid Atlantic / PJM, California, Texas, and Ontario energy markets

Alternative Energy Conference
Presentation Outline

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- Demand Response is a Renewable!
- DR Program Design – Balancing Grid Operator and End-User Needs to create vibrant markets
- Emerging Energy Efficiency Markets
    - Monetizing Efficiency in the DR Markets
    - Emerging Markets - White Certificates
- Summary of Key User / Policy Considerations

Demand Response
- *What it looks like*

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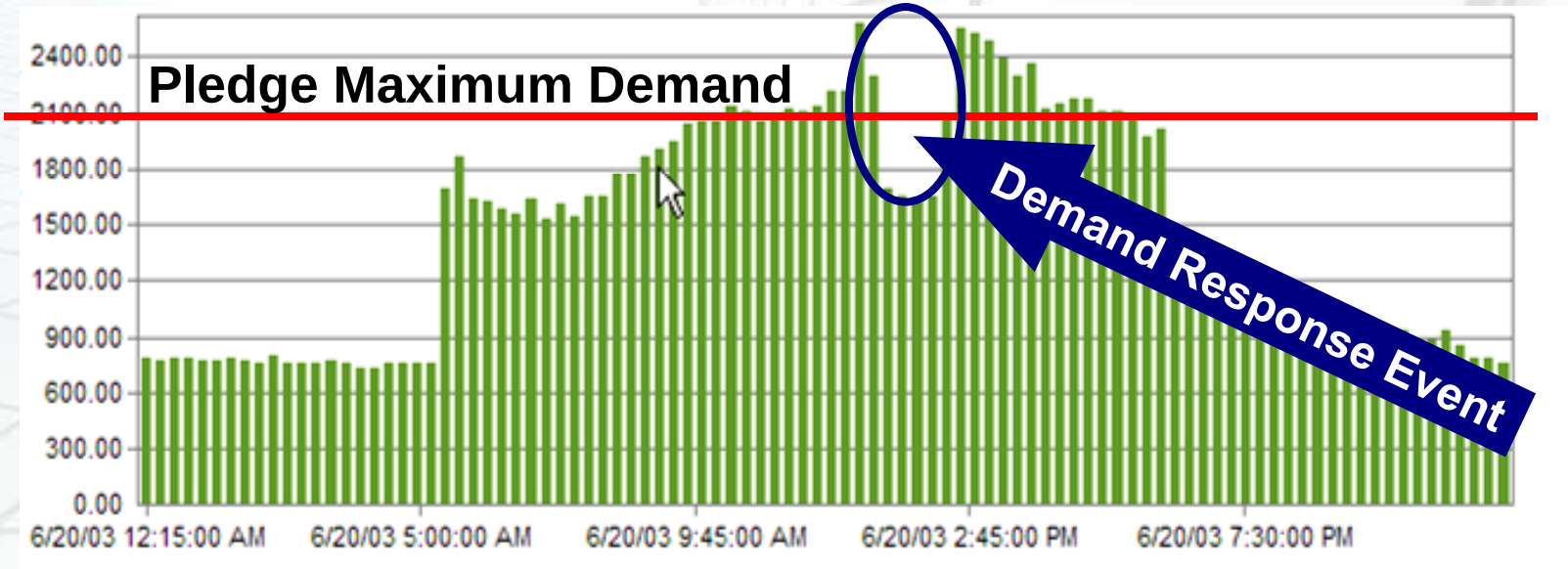

- ***Buildings act as "peaker" or "reserve" power plants***
- ***Demand Response reductions provide "insurance" for the grid***
- ***Demand Response programs typically provide MWs in 10-minutes (synchronous reserves) – 3 hours (capacity)***
- ***DR Programs are managed by the ISOs and/or Utilities***

Demand Response
- *Where it comes from*

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Buildings reduce energy demand temporarily




- ***Shut Downs: Total Plant Shut downs; turning off non-essential lights, fans, pumps, HVAC units, elevators***
- ***Reductions: pre-cooling; global temperature re-sets, cycling***
- ***Fuel Optionality: i.e. switching from electricity to steam***
- ***Emergency Power: activate emergency generation (not renewable)***

Demand Response
- Can meet immediate supply needs

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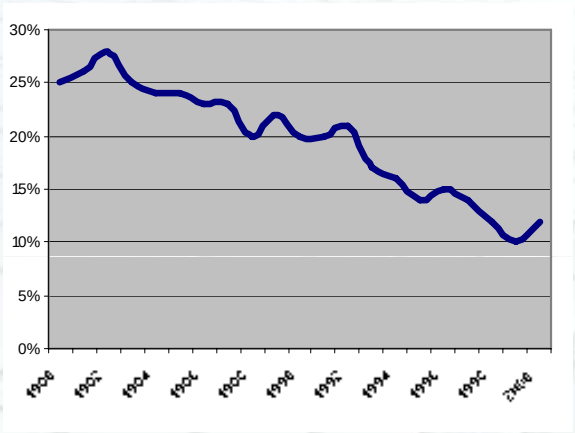
Decreasing Generation Capacity Margin



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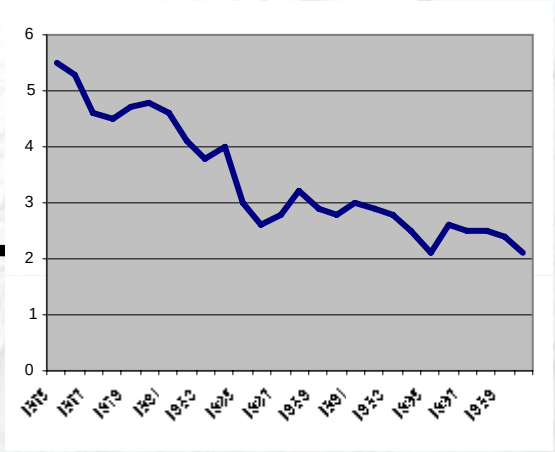
U.S. Transmission Investment



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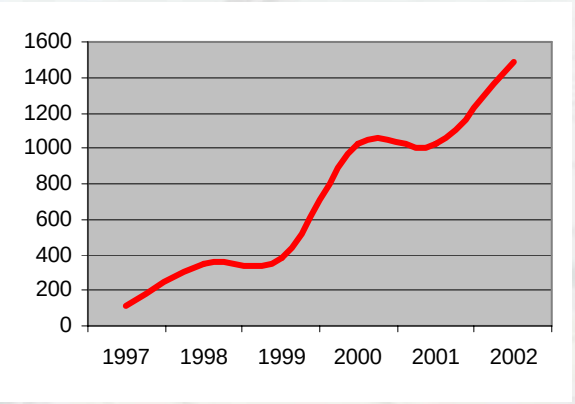
U.S. Load Relief (Reliability) Events



Rand Corporation study concluded:

The utility industry could save between $50 - $100 billion over the next two decades if “demand response becomes the norm”

Source: Electric Perspectives, July/August 2001, Western States Power Crises White Paper, EPRI, Summer 2001.

Demand Response
- Enables emissions reductions in buildings

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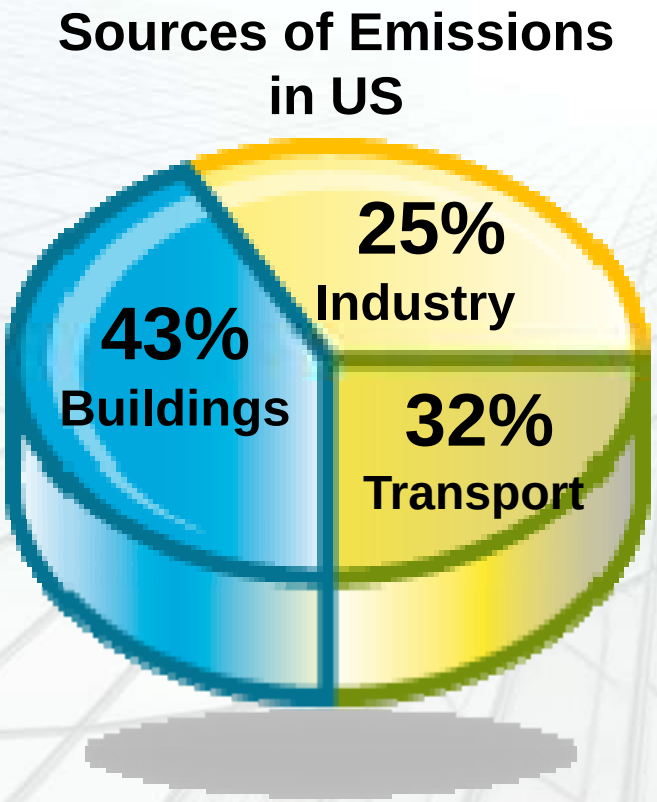

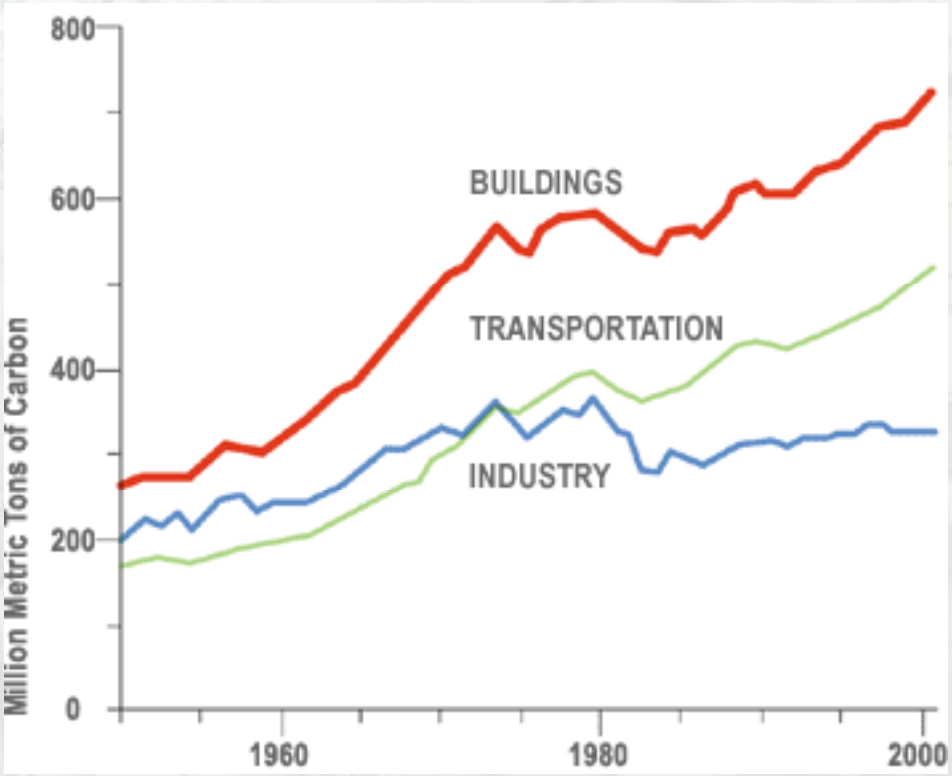

Source: www.greenerassets.com (graph) and The Durst Organization / durst.org (pie chart)

Demand Response
- Can be a major & efficient renewable resource

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- **US Market Size:** ~10% of all demand; 300,000MW
- **Economic Value:** 1kW of increased supply = 1nW of reduced demand
- **Efficiency:** Saves transmission line loss of 7-9%
- **Reliability:** Delivers flexible supply for grid operators - "just enough; just in time"; reduces the likelihood of black-outs
- **Reduced Capital Cost / Speed to market:** reduces need for new power plants just for peak demand periods; faster deployment
- **Market Benefits:** reduces the price of electricity for all customers by reducing the cost of the last kW required

Source: USDOE Benefits of DR in Electricity Markets and Recommendations for Achieving Them, February 2006

Demand Response Economics....
- Quick Installations, low cost per kW

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Installed Cost per kW

Solar	$6,000 - $10,000
Wind	$1,500 - $3,000
Fossil Fuel	$500 - $1,000

Cost per kWh of energy produced

Solar	$.20 - $.40
Wind	$.05 - $.10
Fossil Fuel	$.053 (2006)

Sources:
Installed Costs:
http://www.solarbuzz.com/DistributedGeneration.htm
Cost per Unit: Coal and Natural Gas costs from International Energy Outlook, 2006

Demand Response Install Costs*

Metering	$0 - $5,000 / site
Controls	$0 – $2,500 / point
Datacom	$0 - $1,200 / year
Training	$1,000 - $5000 / site
Total	**$1,000 – $13,700+**

In most cases, DR is leveraging existing building assets

Cost per kWh

- Typically no additional cost AND
- Participants realize kWh savings

REVENUE for Demand Response

Capacity: $40 - $100 / kW / year
Reserves: $24 - $150 / kW / year

**** DR Provider costs not included***

Deploying Demand Response….

Program Design that balances Grid Operator & End-user need is key

Existing “Business Models”

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- **Sources of Revenue / Savings for customer**
  - Utility bill savings; CPP/TOU rates; rebates
  - Utility payments
  - ISO Market Capacity Prices
- **Implementation & Program Management**
  - 100% utility
  - Utility contracts vendors for DR programs
  - Mixed: Utility programs and private firms coexist

Demand Response
- Key Elements of Program Design

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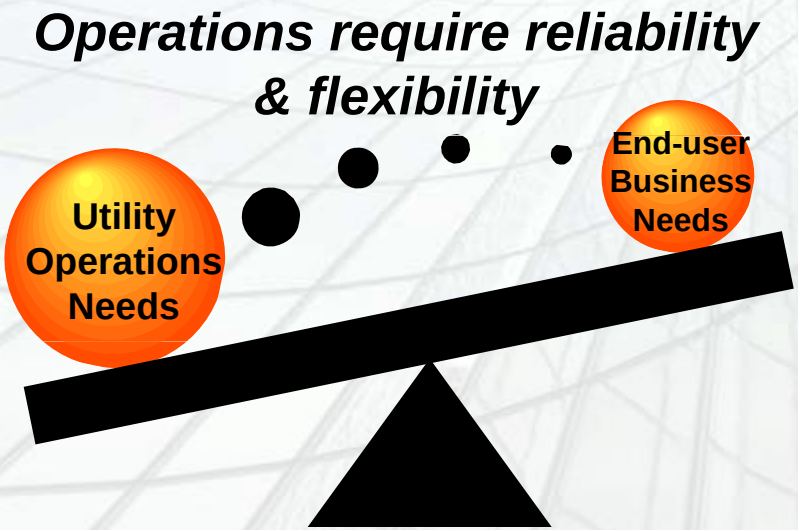

- **What triggers Demand Response events**
- **How much notice is given for events**
- **How often / how long do events occur**
- **How is performance measured (Methodology / Metering Requirements)**
- **What are the Risks / Penalties for underperformance**
- **What is eligible to participate (i.e. generators, curtailment, etc.)**
- **What is required to enroll (paperwork, information required, etc)**
- **How much does it pay? (generally a price per kW/mo or MWh)**

Research / Studies
Why end-users participate in DR

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Clients put their core business above DR

In order of importance:

1. To obtain bill credits and incentive payments
2. To help the utility company during peak situations
3. To help the community
4. To obtain non-financial product or service
5. Other – increasingly green / sustainability initiatives*

Source: Demand Response: Design Principles for Creating Customer and Market Value

Peak Load Management Alliance - November 2002 http://www.peaklma.com/files/public/CustomerPrinciples.pdf

** Added by ConsumerPowerline, April 2008*

ConsumerPowerline Portfolio Experience
Common Barriers

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MARKET DESIGN PITFALLS

1. Too Many Events
2. Events are too long
3. Unpredictable basis for calling events
4. Over-reliance on price signals – customers don't want volatility
5. Penalty risk is not worth potential reward

DR PROGRAM IMPLICATIONS

- **KEEP RELIABILITY PROGRAMS LIMITED TO TRUE EMERGENCIES**
- **OFFER RISK & REWARD "MENU" OF DR PROGRAMS**
- **CREATE ON-GOING DIALOG / FEEDBACK LOOP WITH NON-GENERATORS ON DR**
- **REMEMBER IT'S A FREE MARKET – CLIENTS VOTE WITH THEIR FEET**

ConsumerPowerline Portfolio Experience
Common Barriers

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STRUCTURAL BARRIERS

1. Misaligned Incentives / Mistrust of Utilities
   - Could DR actually reduce utility revenues?
   - How does the utility share the benefits of DR?
2. Metering / Interval Data Availability
   - Utility Metering departments can be critical to effective deployment
3. DR, Efficiency & Operations "Silos"
   - Programs can work against each other – i.e. too many calls by Operations shrink DR participants

DR PROGRAM IMPLICATIONS

1. **DEFINE 'BUSINESS MODEL' FOR UTILITY VIS A VIS DEMAND RESPONSE**
2. **BUILD TRANSPARENT PRICING / REVENUES**
3. **COORDINATE / ALIGN DR PROGRAMS AND UTILITY METERING DEPARTMENTS**
4. **ALIGN INTERNAL DECISIONS / PROGRAMS**

ConsumerPowerline Portfolio Experience
Common Barriers

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COMMUNICATION CHALLENGES

1. Lack of Awareness
   - Decision-makers are unfamiliar with the concept, or have an old/inaccurate understanding of DR

2. Poor Education / Marketing / Outreach
   - Materials are not written for non-energy audience
   - Materials are too long / complicated / detailed
   - Message / selling points don't distill simple, compelling end-user benefits

DR PROGRAM IMPLICATIONS

1. **LONG SALES CYCLE**
2. **HIGH COST OF SALES**
3. **DIRECT SALES FORCE REQUIRED**

ConsumerPowerline Portfolio Experience
Common Barriers

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CLIENT BARRIERS

1. Limited Staffing Capacity / Competency to implement programs
   - Facility managers are too busy putting out fires - where does this fit in their day?

2. Lack of incentives for staff
   - Engineers/Facility managers don't receive recognition or bonuses
   - Buildings / properties don't receive revenues – they go to the general budget (the black hole)

3. Can be difficult to close the Sale
   - No sense of urgency; not a business imperative
   - Many yes-es required – building engineer, property manager, finance, owner, et al
   - Risk Aversion /Legal issues

DR PROGRAM IMPLICATIONS

1. **ADDRESS THE 'HASSLE FACTOR'**
2. **MITIGATE CLIENT RISK**
3. **DIRECT SALES FORCE REQUIRED**

Demand Response Trends / Considerations

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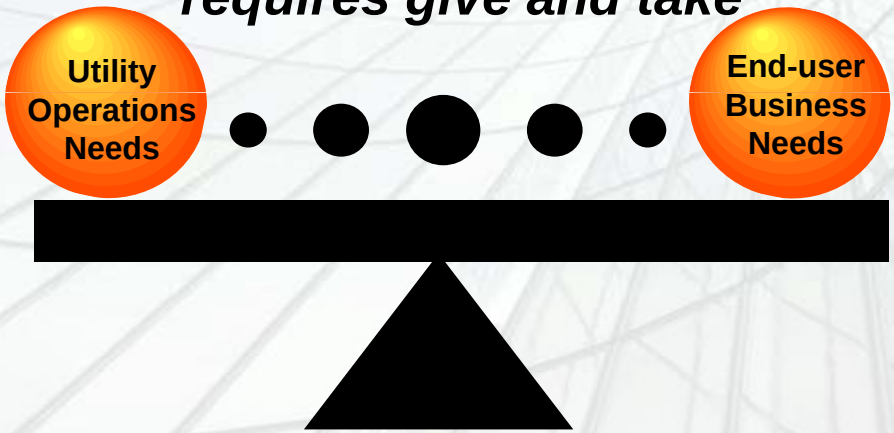
Successful DR Program Design requires give and take



- DR acceptance increasing as participation and reliability improves -- - Ontario paying over $100/kW/year as they seek to replace fossil fuels
- Increase in controls and metering is accelerating participation and makes enrollment by smaller assets viable
- Expansion of DR– now can truly consider DR a national opportunity
- Expansion of Synchronous Reserves
- Utilities increasingly contracting with private firms to provide DR support services, marketing, aggregation, etc
- Prices trending toward an average of about $55-65 per kW nationally

Emerging Energy Efficiency Markets

Permanent Efficiency
- Defined

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- Capital Projects / Upgrades that yield permanent reduction in energy use
- Can be measured in terms of peak kW reduced and/or kWh reduced
- Examples of qualifying projects (eligibility varies by program/region)
  - Lighting retrofits
  - New HVAC systems
  - New Chillers
  - Cogeneration (some areas)
  - Renewable Generation

Emerging Markets for Permanent Efficiency

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- Utility funded DSM (demand side management) programs
- Demand response programs allowing “bids” for permanent efficiency (New England Forward Capacity Market “ODR”)
- EPS (environmental portfolio standards)
  - White certificates
  - Energy intensity standards

Overview of EPS Market Design

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- **What creates a market:** an EPS
- **Where will markets be:** Any geographic area can achieve whatever level of efficiency it chooses, e.g. a 40% standard requires marketers to purchase four certificates for each ten units of electricity sold
- **Who will buy in this market:** Anyone who markets electricity (soon, other fuels as well) needs to document that they have purchased certificates from people who have installed some documented energy efficiency retrofit
- **Who will sell in this market:** Certified retrofits.

New Market Revenues for Efficiency
Demand Response & White Certificates

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Example – **National Chain Lighting Retrofit:**

Lighting retrofits
100 stores; 7,000kW total reduction
# of hours reduction/yr: ~5,000
# of years of reduction: 8.5 years

Market value:

"Other Demand Response" in ISONE:

~ $45 / kW for 7-10 years → **$3,100,000**

"White Certificates" in CT, PA:

~$25/MWh for 7-8.5 years → **$7,400,000**

Efficiency Dollars
– Market Design Considerations

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1. **Reward the investor –** The “credits” should be owned by the decision-maker / the investor / the operator
   - Some rebate programs require investor to forfeit white certificate value
   - The “owner” of the credits should be the people who actually spend the money and who manage the use of the equipment post-investment

2. **Don’t limit the market by heavy meaasurement & compliance requirements –** We don’t have to measure everything that can also be assumed statistically
   - Require only large projects to be metered
   - Small projects should be verified by simple evidence of purchases of eligible products or services and standard reduction assumptions
   - Open markets to consumers

Conclusions

Policy Considerations
– Market Design

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Demand Response

- Create competitive, market-based Demand Response Programs (not monopolies) priced at levels on par with generation
- To maximize enrollment, create / offer a menu of program options & prices so facilities can choose appropriate effort: reward
- Do not require minimum kW reduction levels for participation (i.e. 1MW for Reserves)
- Include AMI installations at smaller facilities (i.e. 250kW peak demand)

Permanent Efficiency

- Ensure facility owner / project investor owns “credits”
- Minimize M&V requirements (metering) on smaller projects
- Minimize on-going M&V / registration requirements

Thank You

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