ACEEE Energy Efficiency Finance Forum

Arlington, Virginia

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Legislative and Regulatory Changes Affecting the Financing of Energy Efficiency Projects

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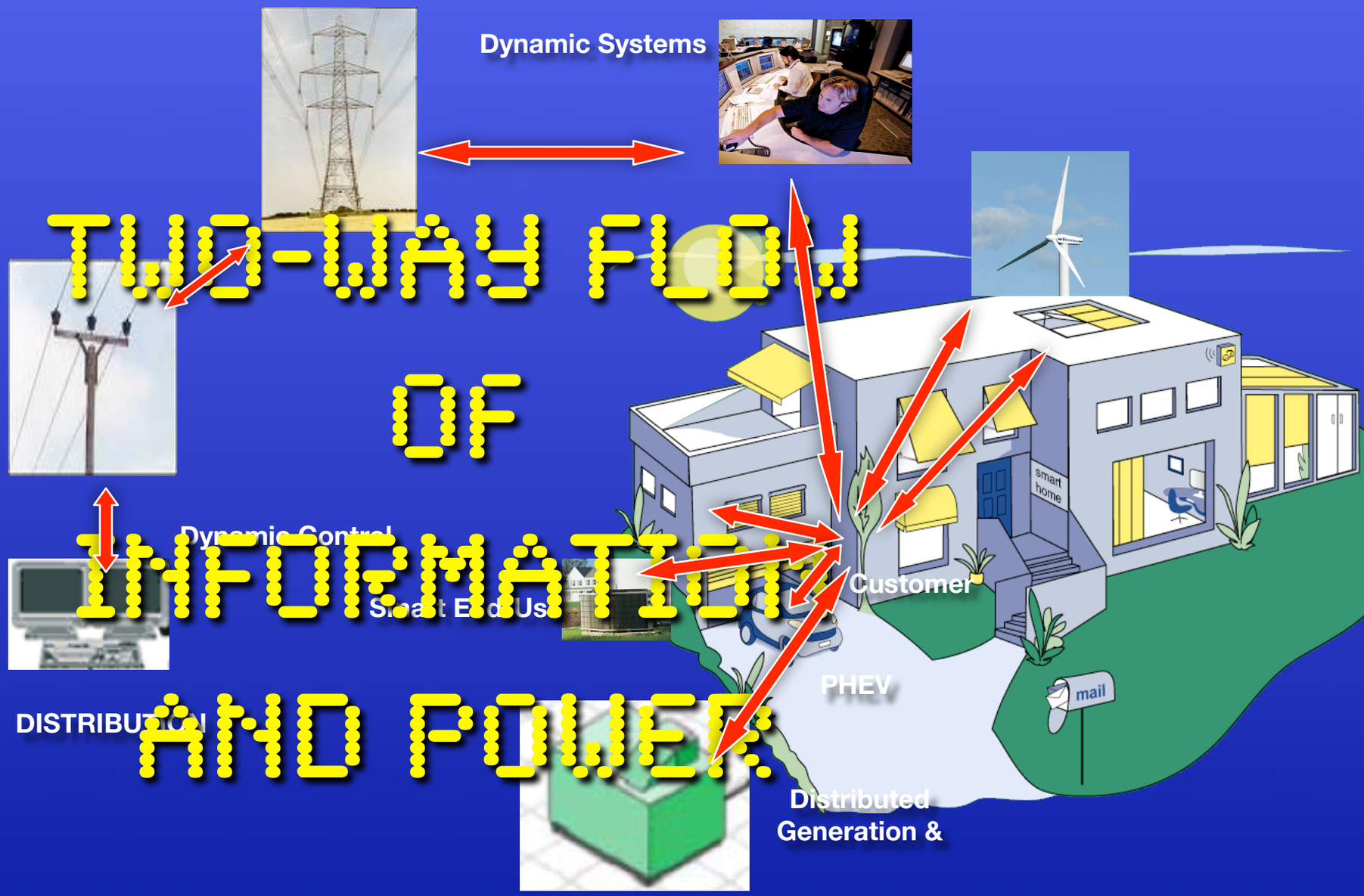
Hypothesis #1:

A Competitive Electric Market with a Smart Grid Will Enable Maximum Financial Investment in Energy Efficiency

Hypothesis #2:

That Investment Will Far Exceed Energy Efficiency Investment Under a Vertically Integrated Cost of Service Model

What is a Smart Power Grid?

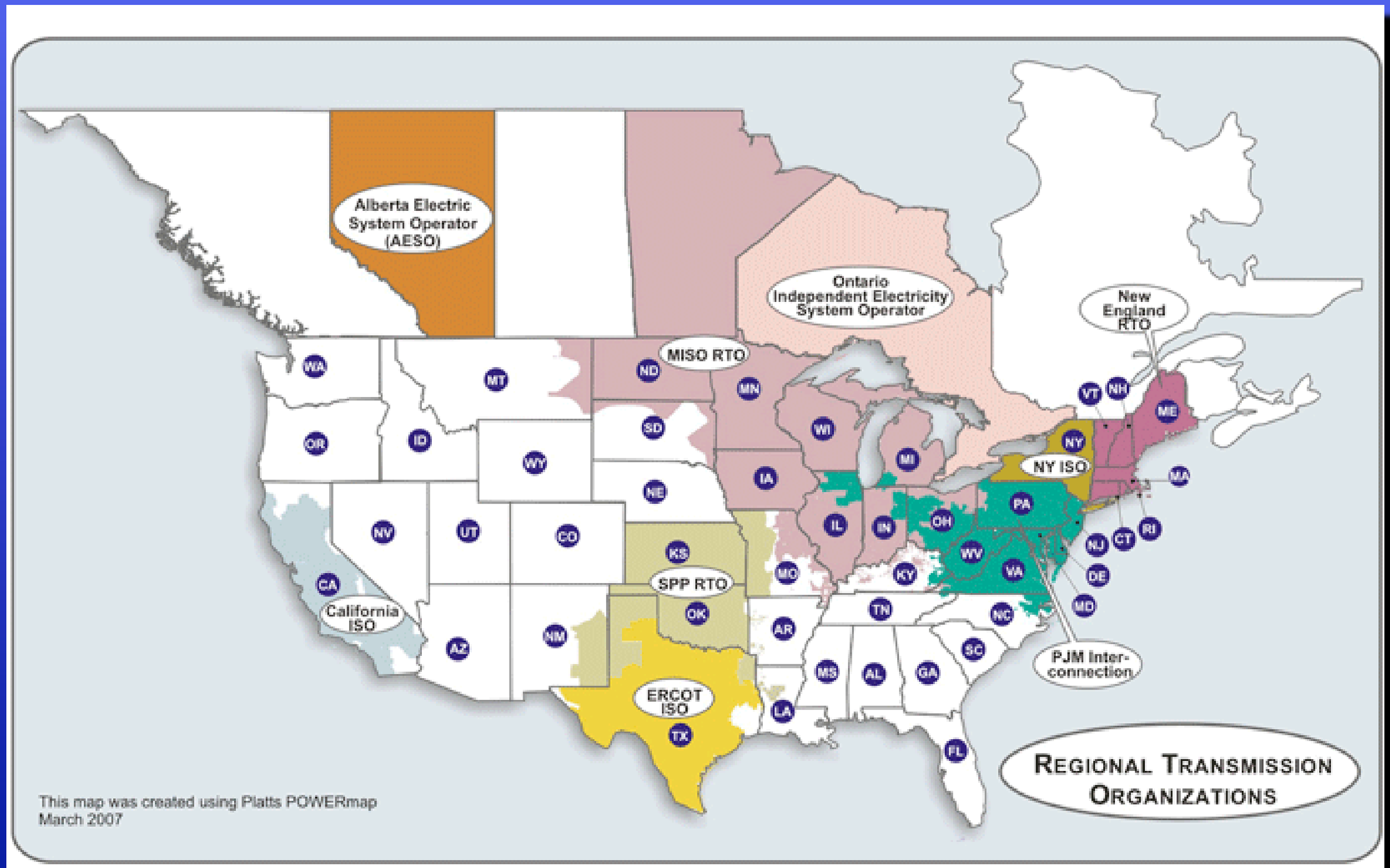


Critical Qualities of Smart Grid

- **Technically Accommodates Via Two Way Communication, Measurement, and Verification Protocols a Wide Variety of Supply and Demand Resources.** *Smart Grid Accommodates Variety of Resources (Including DR, EE, CHP, PHEVs, Storage,Wind, PV)*

- **Provides for Regulatory, Structural, and Financial Mechanisms That Fully Enables Maturing Competitive Electricity Markets That Incorporate and Compensate Demand Resources on an Equal Footing with Supply Resources.** *Smart Grid Allows for and is Supported by Competitive Markets that Provide Full Financial Support for DR/EE.*

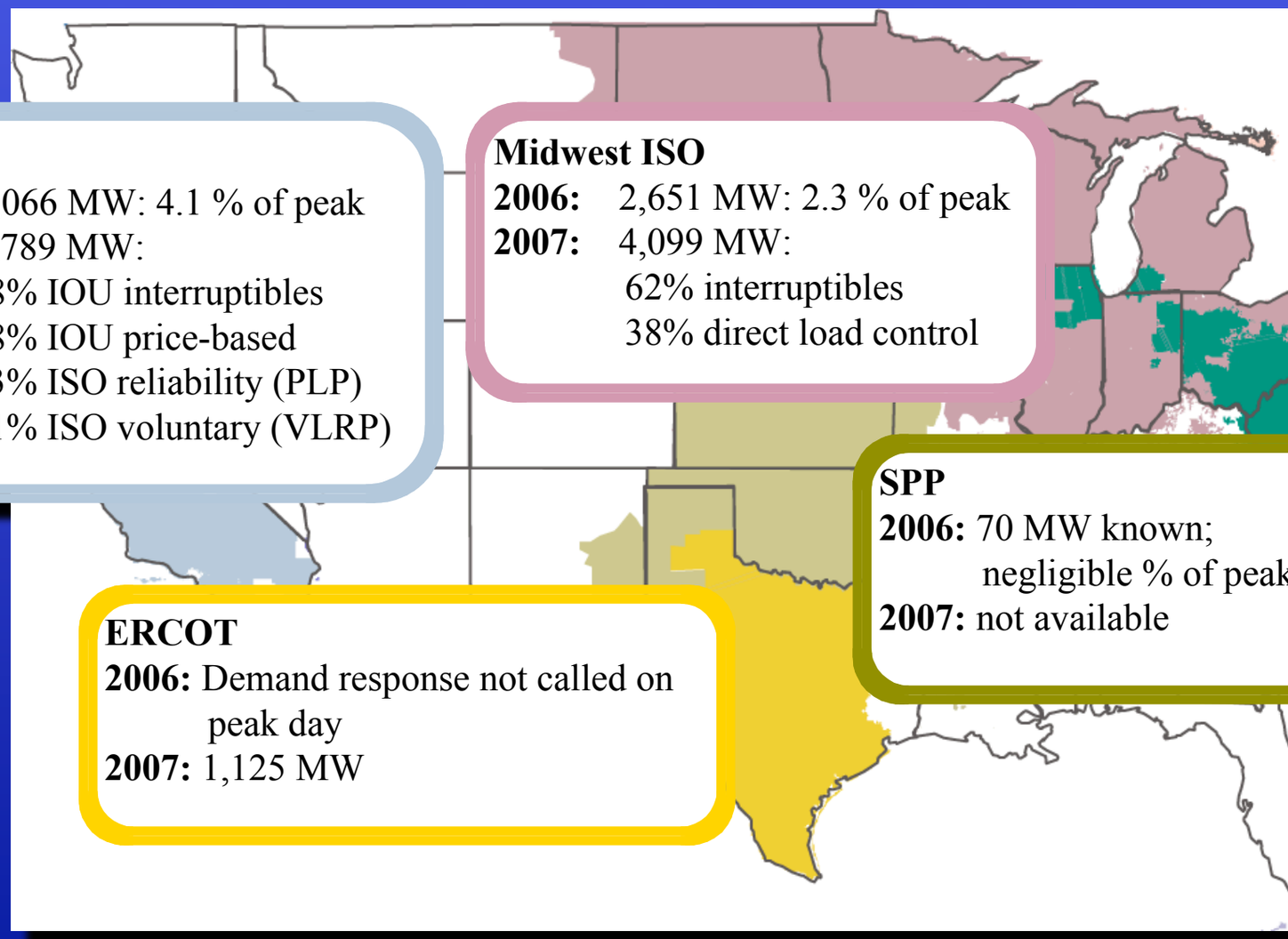
Organized Wholesale Markets



FERC Enabling Actions for DR

- Demand Resources Participate in Energy markets:
  - ISO-NE, NYISO, PJM Currently
  - MISO, CAISO, SPP in Development
- Demand Resources in Ancillary Services Markets:
  - ISO-NE, NYISO, PJM
  - MISO, CAISO in Development
- Demand Resources in Capacity Markets:
  - ISO-NE's Forward Capacity Market Auction
  - NYISO's Special Case Resource Auctions
  - PJM's Reliability Pricing Model Auctions

Results of FERC DR Initiatives



CAISO
2006: ~ 2,066 MW: 4.1 % of peak
2007: 2,789 MW:
58% IOU interruptibles
38% IOU price-based
3% ISO reliability (PLP)
1% ISO voluntary (VLRP)

Midwest ISO
2006: 2,651 MW: 2.3 % of peak
2007: 4,099 MW:
62% interruptibles
38% direct load control

NYISO
2006: 948 MW: 2.8 % of peak
2007: 2,199 MW:
82% reliability
18% economic

ISO-NE
2006: 597 MW: 2.1 % of peak
2007: 1,037 MW:
91% reliability
9% economic

SPP
2006: 70 MW known;
negligible % of peak
2007: not available

PJM
2006: 2,050 MW: 1.4 % of peak
2007: 3,733 MW:
50% reliability
50% economic

ERCOT
2006: Demand response not called on peak day
2007: 1,125 MW

EE As a Market Resource
ISO-NE FCM

- **Procedural Steps**
  - **Settlement Agreement filed March 6, 2006**
    - *Incorporated Decision for EE to Participate in FCM Comparable to Supply-Side Resources*
  - **Approved by FERC June 2006**
- **Auction Mechanics**
  - **Auction Begin February 2008**
  - **3 Year Planning Period- Delivery June 2010**
  - **Qualification Process- Pre-submit Location & Capacity**

EE FCM Bid Example

Capacity Offer	Year 1	Year 2	Year 3	Total
kW Saving Bid	500	500	500	500
FCM Price (per kW month)	$4.25	$4.25	$4.25	$4.25
Total FCM Capacity Payment	**$25,500**	**$25,500**	**$25,500**	**$76,500**
% Capacity				7.83%
Annual Operating Hours	5,000	5,000	5,000	15,000
Annual Energy Savings (kWh)	2,500,000	2,500,000	2,500,000	7,500,000
Avoided Retail Price	$0.12	$0.12	$0.12	$0.12
Total Energy Payments	**$300,000**	**$300,000**	**$300,000**	**$900,000**
% Energy				92.17%
Total EE Payments	**$325,500**	**$325,500**	**$325,500**	**$976,500**

EE FCM Auction Results

- Net Installed Capacity Requirement
  - 32,305 MW
- Clearing Price
  - $4.50 per kW month
- Qualifying Capacity
  - Existing
    - 32,111 MW Supply
    - 941 MW Demand
  - New
    - 5,247 MW Supply
    - 2,483 Demand
- EE Cleared- 700 MW (554 MW Lighting & 146 MW HVAC)

Smart Grid Costs vs. Benefits

Target Sector Costs	10-Year Investment Level ($B)
Residential	**7-10**
Commercial	**13-20**
Network Infrastructure	**$25-30**
TOTAL	**45-60**

Source of Benefits	Potential Benefits/year ($B, by 2015)
"Smarting up" of customer premises (smart homes, intelligent buildings)	**$6-8**
Enabling of Demand Response and AMI deployment	**$5-8**
Investments in smart grid technologies	**$2-3**
DG, smart grid-interactive storage technologies and microgrids	**$1-2**
TOTAL/year	14-21

Regulators Can Create & Destroy Markets for DR

EE Investment Challenge

- Goals
  - Increase Res AC Peak Efficiency 35%+
  - Transform Calif & U.S AC Market to EER 14.5
  - Pay < 400/kW & $.02/kWh

- Barriers
  - Intermittent Rebates
  - Retooling & Product Lead Times
  - High Dist. Margins Dilute Cust. Rebates
  - Utility Financing

EE Investment Challenge

- Program
  - 6 Year Commitment- Progressive Ramp
  - Direct Rebate to Man. Buy Down Cost of EER 14.5 to Cost of EER 10
  - AC Consultant to Lead Program and Negotiate With Major Man.
  - $3.4 Billion Total
  - 3,000+ MW Peak Savings for 6 Years or 10,000+ MW for 12
  - Save 1911 GWh in 6 Years
  - Cost <$400/kW over 12 Years

EE Investment Challenge

Residential			Peak Adj Factor		0.7					Raise					
Weighted Ave Kw / Unit Red	kWh/ Unit Rec	Market Size	Opportunity/ y	Opportunity/ year - GWh						DOE Regional					
3.25	1.365	977	660782	902	645.6					Minimum					12 Year
	2009	2010	2011	2012	2013	2014		2015	2016	2017	2018	2019	2020	Grand Total	
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Total							Total	
	1%	20%	40%	70%	80%	85%		100%	100%	100%	100%	100%	100%		
MW	9	180	361	631	722	767	2670	902	902	902	902	902	902	8082	
MW w Cyclinç	12	244	487	852	974	1035	3604	1218	1218	1218	1218	1218	1218	10910	
GWh	6	129	258	452	516	549	1911	646	646	646	646	646	646	5784	
GWh * 18 Yea	116	2324	4648	8134	9296	9877	34397	11621	11621	11621	11621	11621	11621	104120	
$$ / Unit	$3,279	$2,966	$2,654	$2,068	$1,483	$1,034	$1,757								$580
Rebate/Unit	$2,623	$2,373	$2,123	$1,655	$1,186	$827	$1,230	Weighted						Weighted	$406
Rebate/ Ton	$807	$730	$653	$509	$365	$255	$378	Average/ Ton						Average/ Ton	$125
Program M&V	656	593	531	414	297	207	527								174

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6				
Price / kW	$1,500	$1,400	$1,300	$1,000	$700	$500				
Price/ kWh	$0.07	$0.06	$0.05	$0.04	$0.03	$0.02	Cost/ kW		Cost/ kW	
Market Share	1%	20%	40%	70%	80%	85%	& kWh		& kWh	
Dollars/kW	$13,529,511	$252,550,880	$469,023,064	$631,377,201	$505,101,761	$383,336,158	$2,254,918,575	$844.59		$279.02
kWh Years	18								w/ Cycling	$206.68
Dollars/kWh	$8,134,359	$139,446,147	$232,410,245	$325,374,343	$278,892,294	$197,548,708	$1,181,806,096	$0.03		$0.01
Total Dollars	$21,663,870	$391,997,027	$701,433,309	$956,751,544	$783,994,055	$580,884,866	$3,436,724,671			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