Missouri Statewide DSM Market Potential Assessment

Presentation of Draft Results

January 20, 2011

Agenda

- Introductions
- Project overview
- Results Summary
- Electricity
  - Technical and Economic Potential
    - Inputs
    - Results
    - Sensitivity to avoided costs
  - Achievable Potential
    - Payback scenarios
    - Incentive based scenario

Draft Agenda - continued

- Natural Gas
  - Technical and Economic Potential
    - Inputs
    - Results
    - Sensitivity to avoided costs
  - Achievable Potential
    - Payback scenarios
    - Incentive based scenario

Draft Agenda - continued

- Demand Response Potential
  - Analytic approach
  - Results
- Appendices
- Next steps

Project Summary

OBJECTIVE

- Develop estimates of the technical, economic, and achievable potential of electric and natural gas demand side management ("DSM") for Missouri.

METHOD

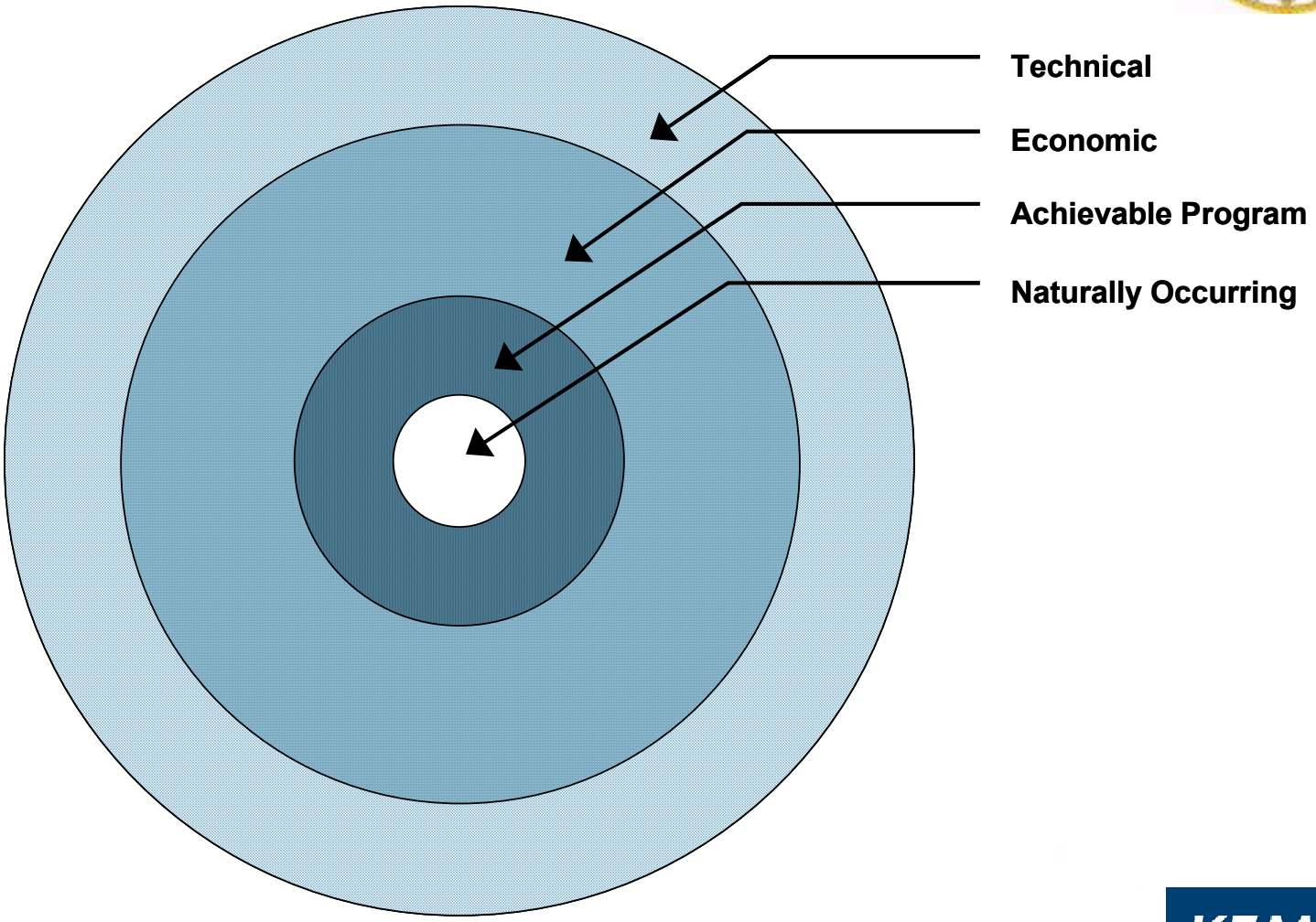
- Use KEMA's DSM Assyst™ model to build estimates of Missouri's DSM potential primarily from data acquired through secondary research.

FINAL DELIVERABLE

- A detailed report containing description of the project approach, estimates of the DSM potential by fuel and sector, and a comprehensive record of study inputs, sources and model outputs.

Review of DSM Potential

Types of Potential

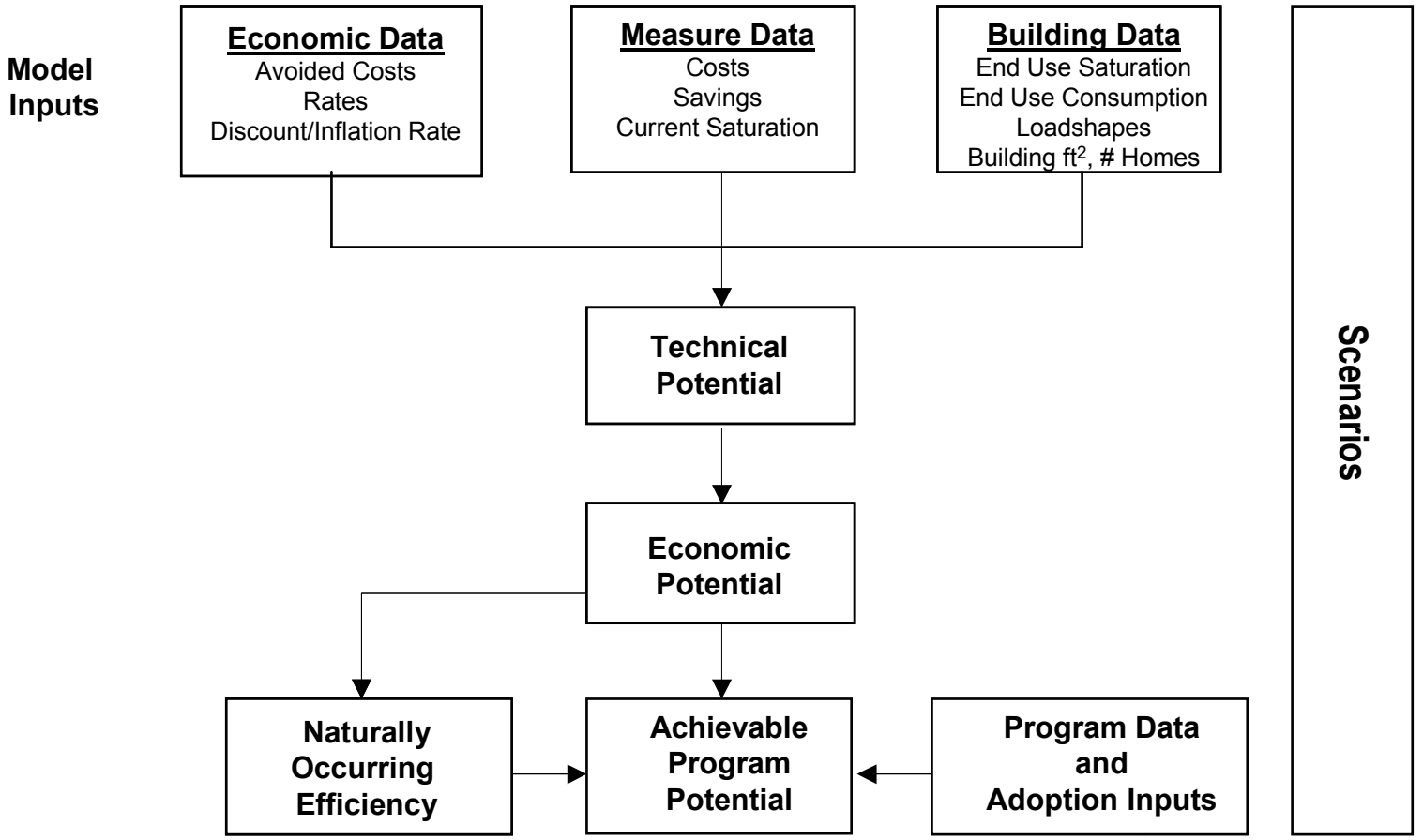


DSM Assyst™ Overview

- Used to estimate energy efficiency potential
  - Technical and Economic
  - Achievable
- Achievable can be driven by a target or a budget
- Main steps in the process:
  - Data Collection (including surveys)
  - Calibration to actual usage
  - Developing Technical and Economic potential
  - Developing Achievable or Program potential

KEMA

Estimating Energy Efficiency Potential



Key Inputs

- Economic Data
  - Avoided costs, rates
  - Discount rates (utility/society, participant)
  - Inflation rate
- Measure Data
  - Costs, savings, applicability, saturation
- Building Data (Baseline)
  - Total units (ft^2, households, etc.) by segment
  - End-use data - (EUIs / UECs, saturations, load shapes

EUI – Energy Utilization Index :: UEC – Unit Energy Consumption

KEMA

Developing a Base Case

- Calibrate model to base usage
  - Typically calibrate to utility energy sales (kWh, therms) and peak demand (MW, therms) for most recent year
    - Reflects current penetration of EE measures
    - Reflects current load shapes
  - Base Year
    - First year of Avoided Cost data
    - Year to which all costs and benefits normalized

What is Technical Potential ?

- **Technical potential** refers to the amount of energy savings or peak demand reduction that would occur with the complete penetration of all measures analyzed in applications where they were deemed technically feasible from an engineering perspective

What is Economic Potential?

- Economic potential is typically used to refer to the technical potential of those energy conservation measures that are cost effective when compared to either supply-side alternatives or the price of energy
- Economic potential takes into account the fact that many EE measures cost more to purchase initially than do their standard-efficiency counterparts
- The incremental costs of each efficiency measure are compared to the savings delivered by the measure to produce estimates of energy savings per unit of additional cost

Economic Potential

- Cost-effective Energy Efficiency
- Economic Potential = Technical Potential for Measures/Market Segments with a TRC ratio* ≥ 1.0

$$*TRC\ ratio = \frac{Present\ Value\,(avoided\ cost\ benefits)}{Present\ Value\,(incremental\ measure\ costs)}$$

What is Achievable Potential?

- Achievable Program Potential refers to the portion of the economic potential that is likely to be captured through program intervention at specific level.

- It takes into account the fact that individuals, for a variety of reasons, do not always make optimal economic choices.

Achievable Program Potential is modeled as a function of:

- Availability
  - Equipment turnover rates
- Awareness
  - Measure economics
  - Market barriers
  - Initial awareness level and decay
  - Program marketing expenditures and effectiveness
- Adoption
  - Measure economics
  - Market barriers
  - Incentive levels and budgets

Electric Energy Savings Potential

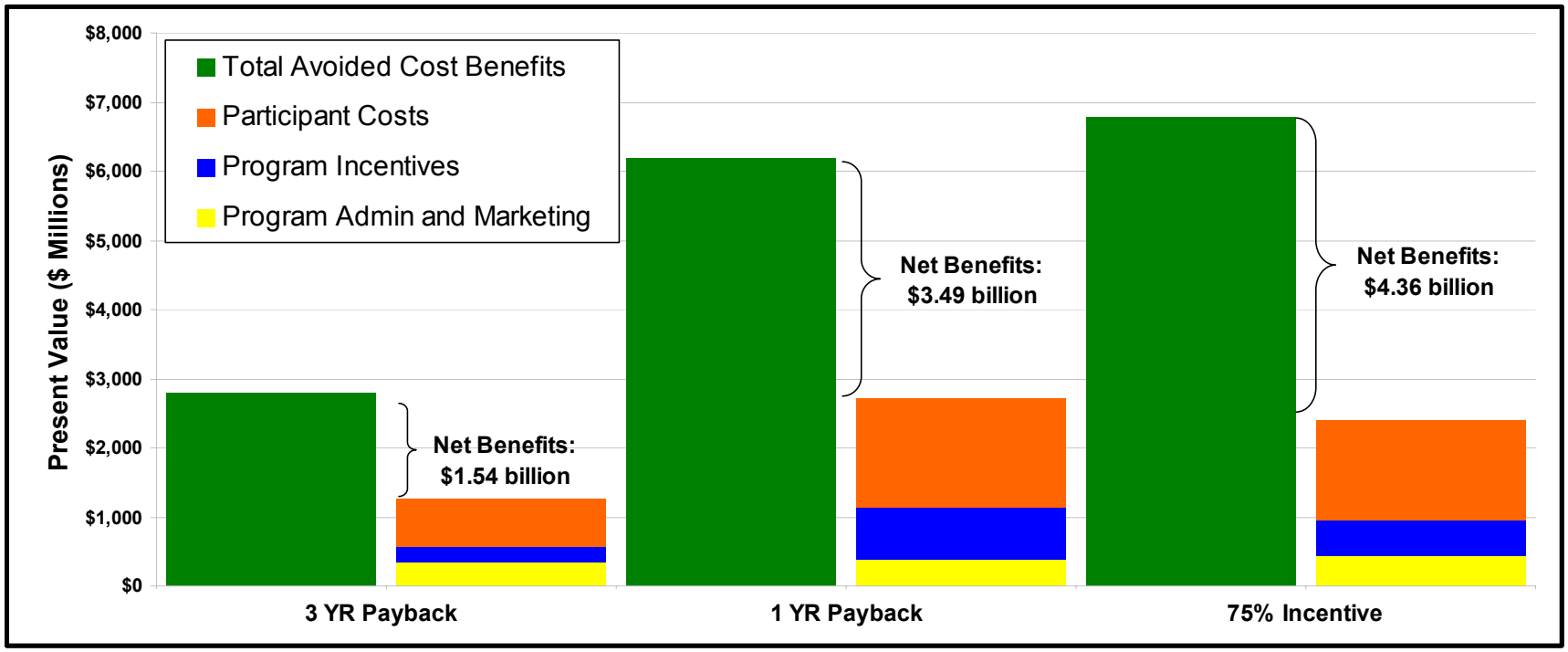
Sector	2020 Base Energy Use (GWH)	Ten Year Cumulative Potential - GWh				
		Technical Potential	Economic Potential	Three Year Payback Achievable Potential - Gross	One Year Payback Achievable Potential - Gross	75% Incentive Achievable Potential - Gross
Residential Existing	41,430	17,579	11,667			
Residential New	104	372	372			
Subtotal	41,534	17,950	12,039	3,191	4,509	6,701
Savings % of Base		**43%**	**29%**	**8%**	**11%**	**16%**
Commercial Existing	32,193	10,274	7,228			
Commercial New	243	1,283	1,283			
Subtotal	32,436	11,558	8,511	2,309	3,163	3,495
Savings % of Base		**36%**	**26%**	**7%**	**10%**	**11%**
Industrial	18,586	3,174	2,658	1,101	1,722	1,745
Savings % of Base		**17%**	**14%**	**6%**	**9%**	**9%**
Total	92,556	32,682	23,208	6,601	9,394	11,942
Savings % of Base		**35%**	**25%**	**7%**	**10%**	**13%**

Electric Demand Savings Potential

Sector	2020 Base Demand (MW)	Ten Year Cumulative Potential - MW				
		Technical Potential	Economic Potential	Three Year Payback Achievable Potential - Gross	One Year Payback Achievable Potential - Gross	75% Incentive Achievable Potential - Gross
Residential Existing	9,265	3,960	3,102			
Residential New	23	62	62			
Subtotal	9,288	4,022	3,164	832	1,623	1,617
Savings % of Base		**43%**	**34%**	**9%**	**17%**	**17%**
Commercial Existing	5,496	1,674	971			
Commercial New	42	180	180			
Subtotal	5,538	1,853	1,151	318	452	483
Savings % of Base		**33%**	**21%**	**6%**	**8%**	**9%**
Industrial	2,313	350	281	108	170	170
Savings % of Base		**15%**	**12%**	**5%**	**7%**	**7%**
Total	17,139	6,225	4,596	1,258	2,245	2,269
Savings % of Base		**36%**	**27%**	**7%**	**13%**	**13%**

Excludes demand response (DR) potential, which is presented separately.

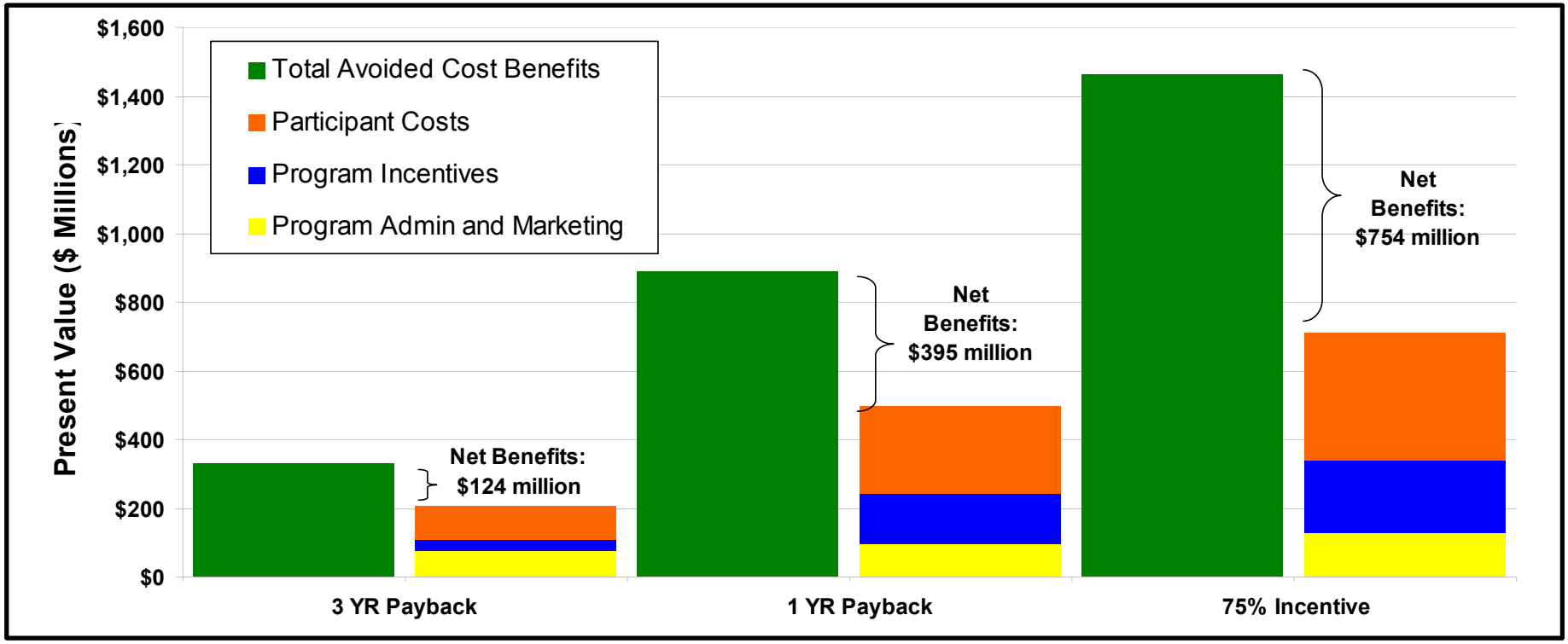
Electric Benefit Cost Summary



Natural Gas Savings Potential

Sector	2020 Base Energy Use - Dekatherms	Ten Year Cumulative Potential - Dekatherms				
		Technical Potential	Economic Potential	Three Year Payback Achievable Potential - Gross	One Year Payback Achievable Potential - Gross	75% Incentive Achievable Potential - Gross
Residential Existing	116,802,808	51,132,703	23,365,190			
Residential New	292,739	3,333,059	3,333,059			
Subtotal	117,095,547	54,465,762	26,698,248	7,877,888	11,790,623	15,789,881
Savings % of Base		**47%**	**23%**	**7%**	**10%**	**13%**
Commercial Existing	69,090,102	24,861,821	17,725,504			
Commercial New	522,091	2,754,860	220,734			
Subtotal	69,612,193	27,616,681	17,946,238	1,999,415	4,653,440	6,232,421
Savings % of Base		**40%**	**26%**	**3%**	**7%**	**9%**
Industrial	67,097,602	9,032,250	8,535,630	1,199,216	2,036,964	3,726,369
Savings % of Base		**13%**	**13%**	**2%**	**3%**	**6%**
Total	253,805,342	91,114,692	53,180,116	11,076,520	18,481,027	25,748,671
Savings % of Base		**36%**	**21%**	**4%**	**7%**	**10%**

Gas Benefit Cost Summary



Demand Response Savings Potential

Scenario	2010	2015	2020	2025	2030
	MW	MW	MW	MW	MW
Business as usual (BAU)	282	282	282	282	282
Expanded BAU	688	1833	1900	1982	2070
Achievable Participation	688	2399	2982	3093	3210
Full Participation Potential	688	2942	4052	4200	4353

Technical and Economic Potential

Inputs

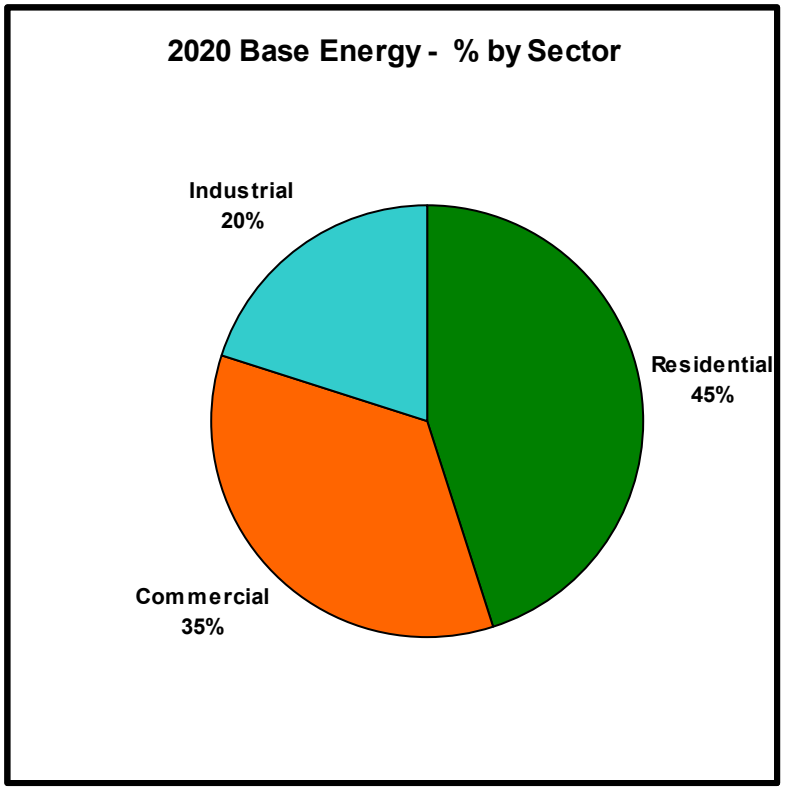
The inputs were developed from Missouri-specific sources to the extent they were available and made available to the PSC and stakeholders in interim memos for review and comment. These include:

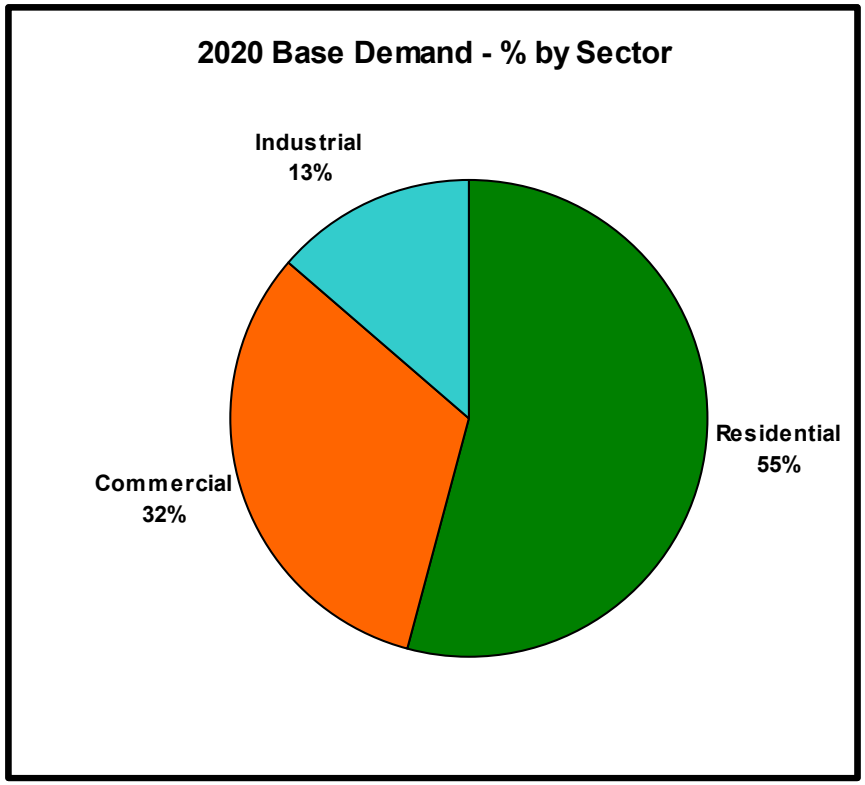
- Baseline data
- Measure data
- Economic data

Inputs are documented in the report appendices.

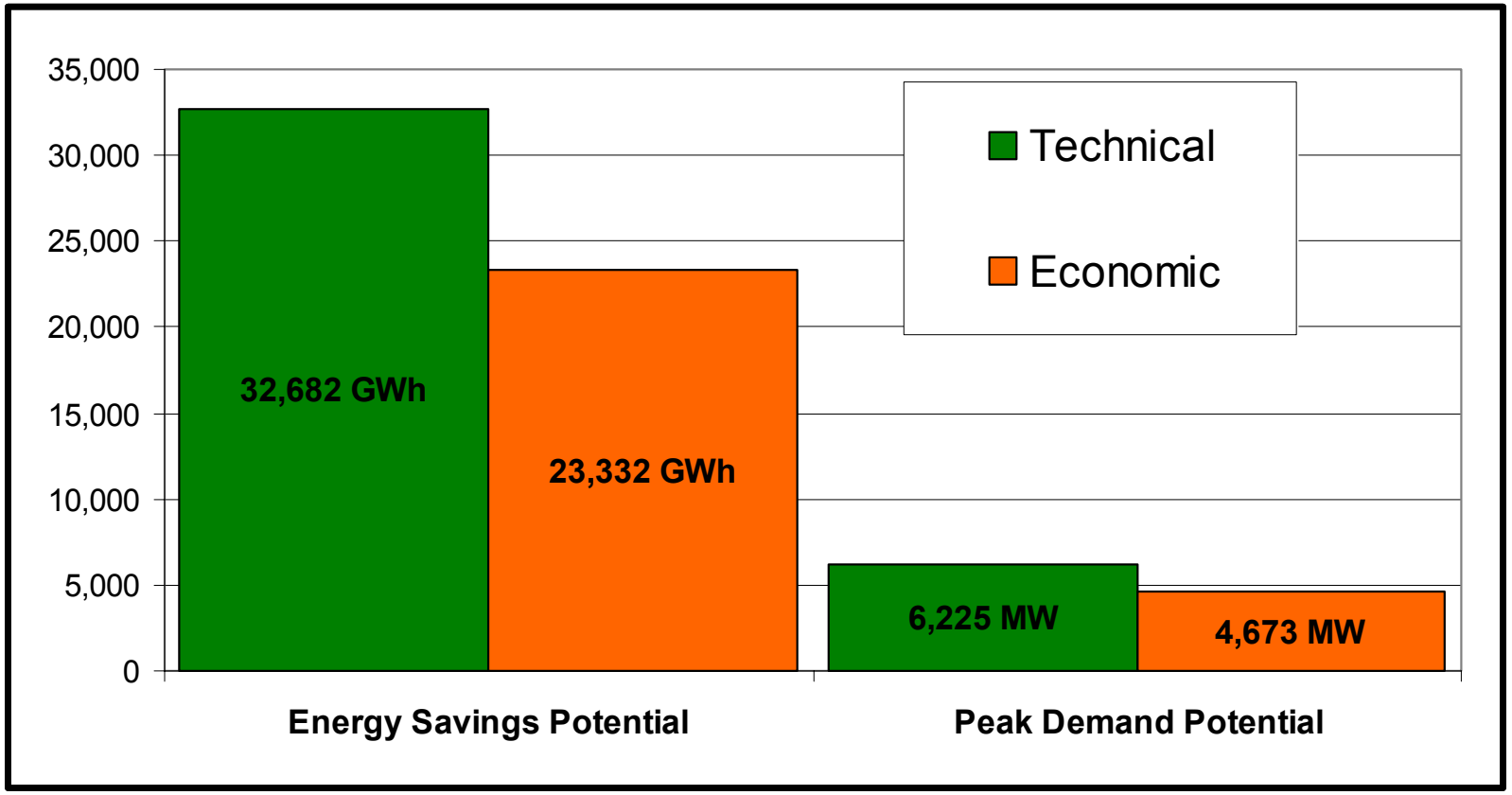
Electricity – Technical and Economic Potential

Sector Contribution to 2020 Baseline Energy and Demand

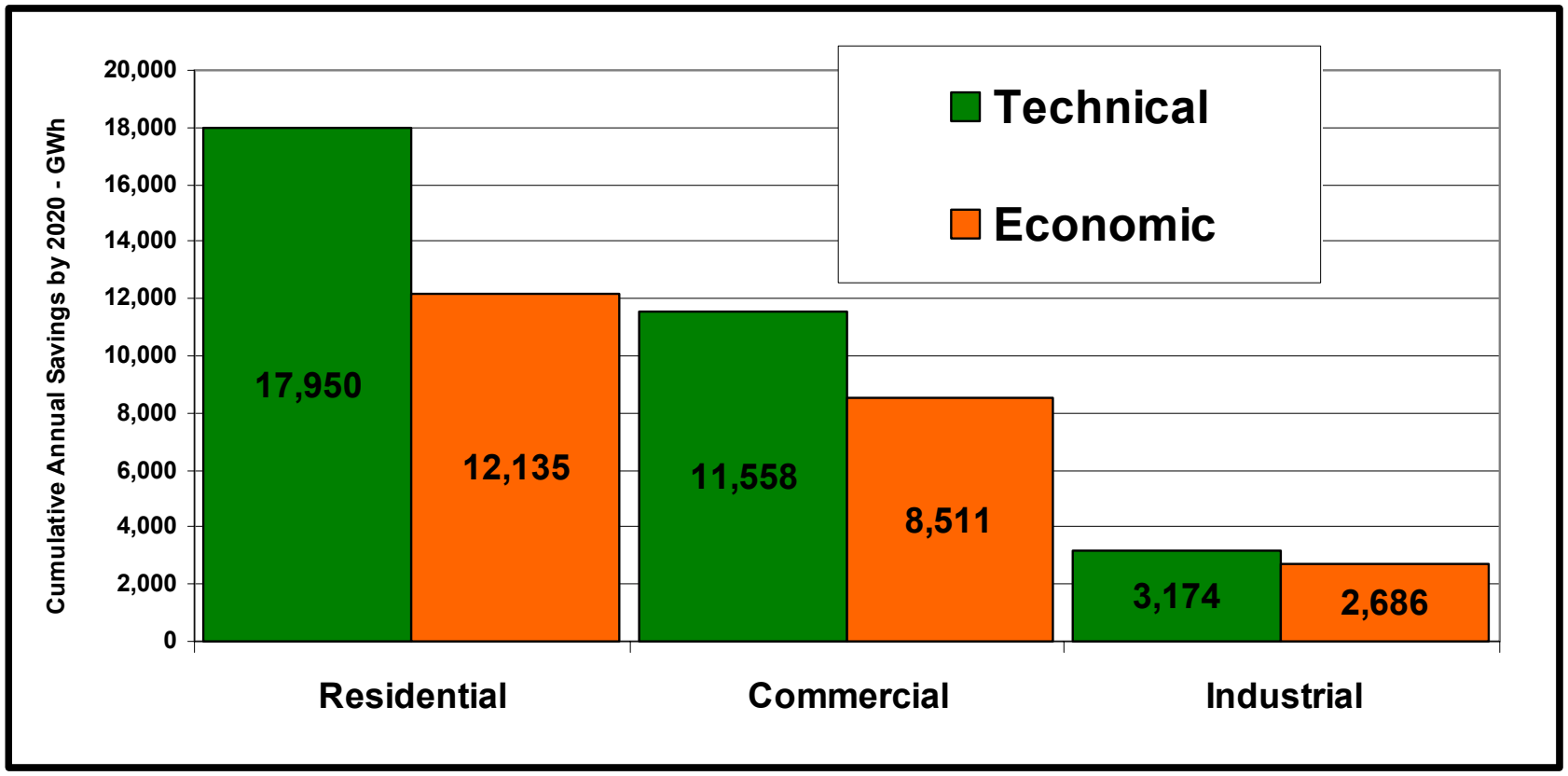




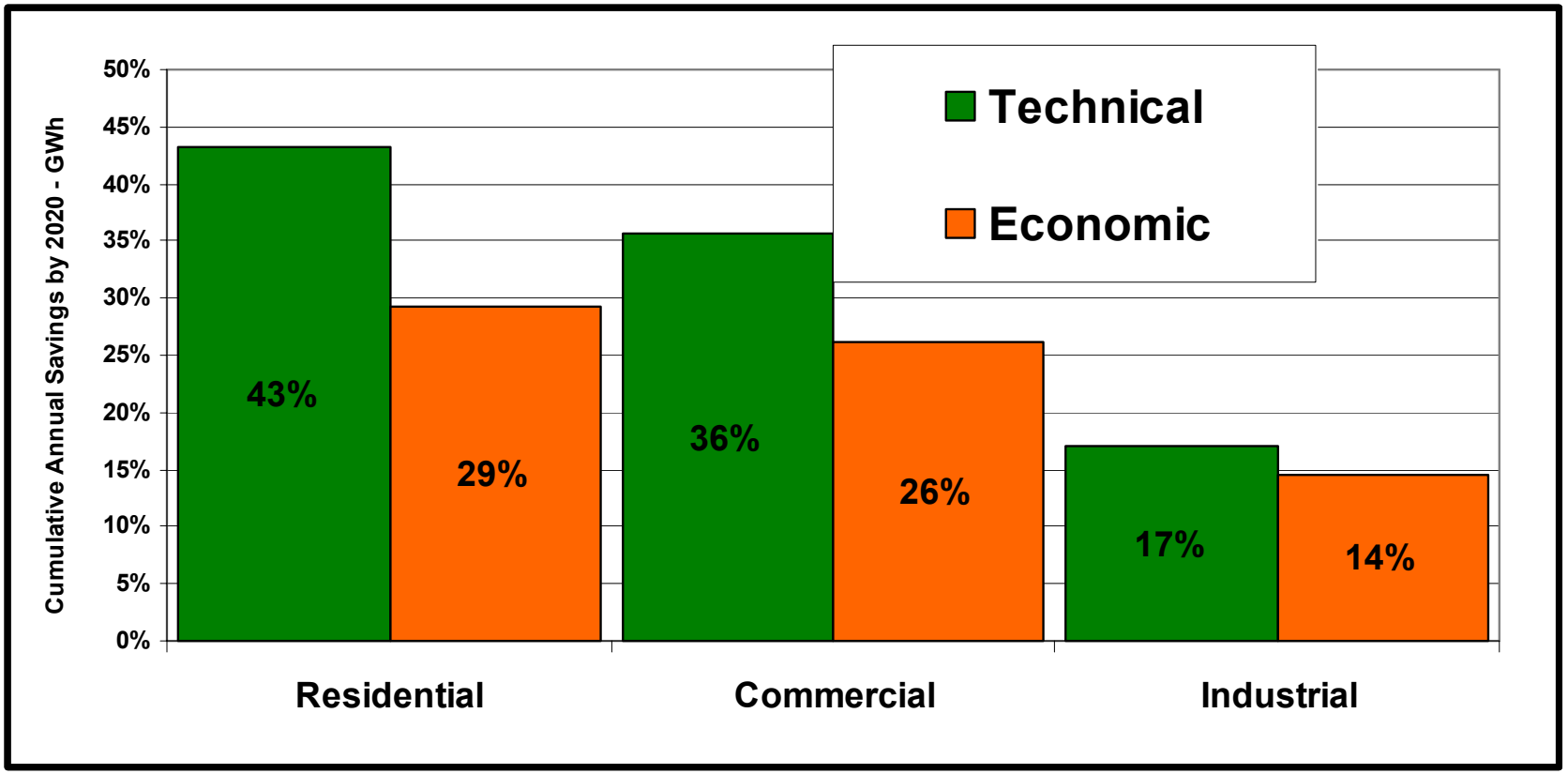
Electric Potential Summary



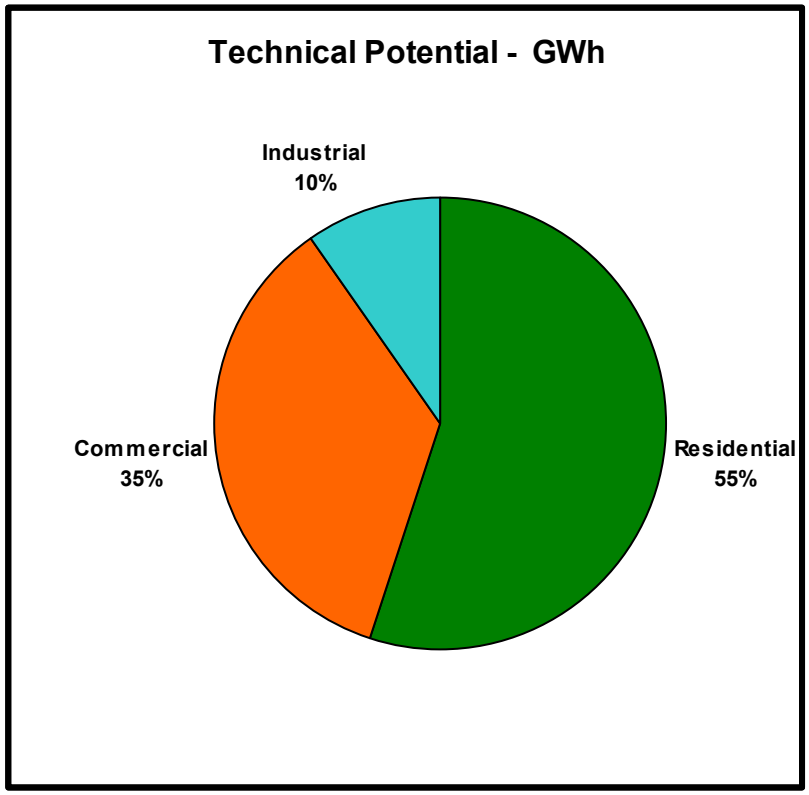
Energy Savings Contribution by Sector

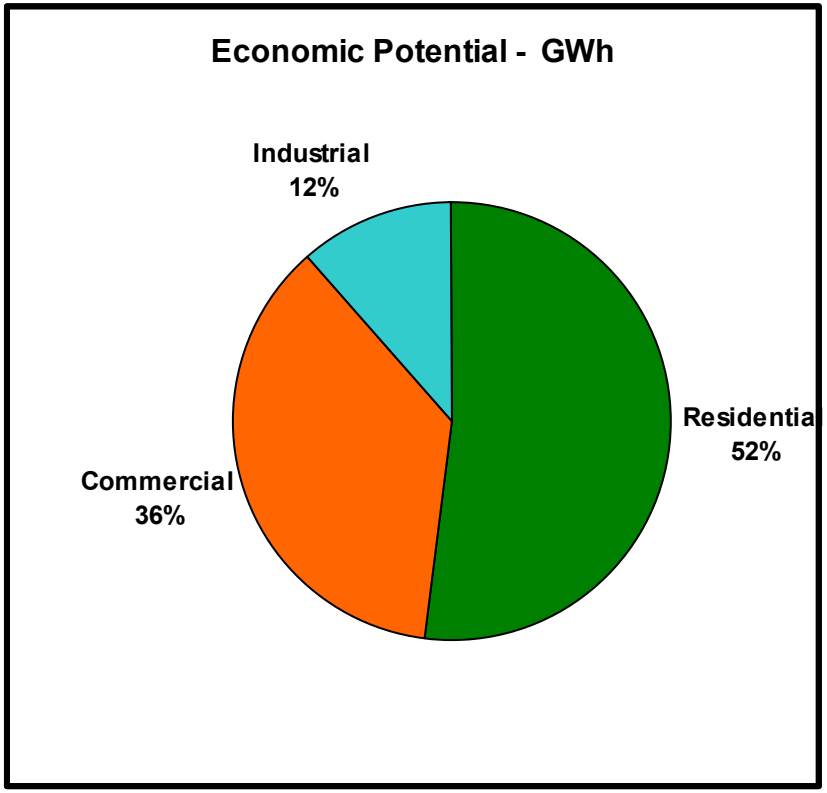


Energy Savings as % of Sector Load

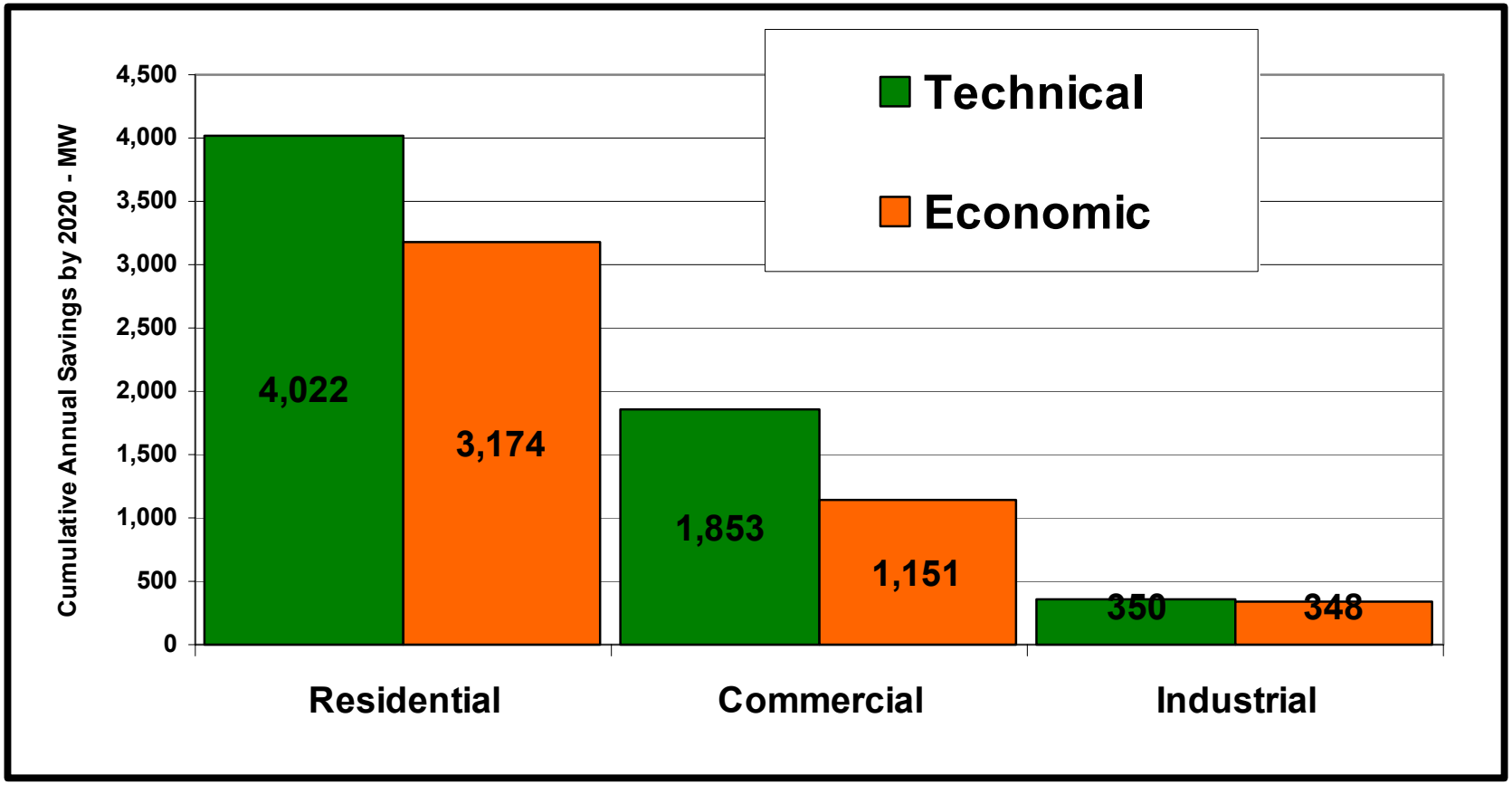


Contribution to Total Energy Savings Potential by Sector

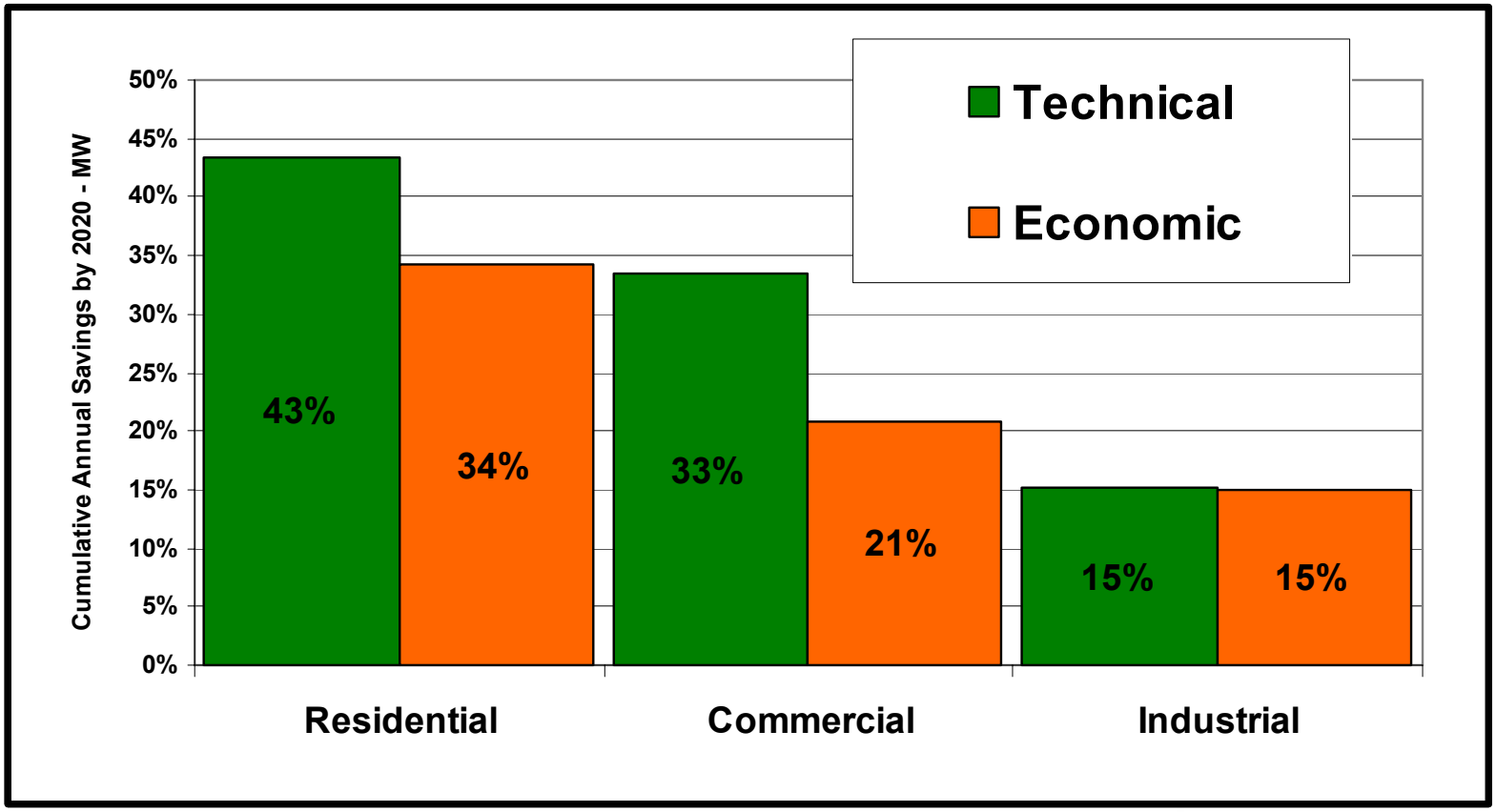




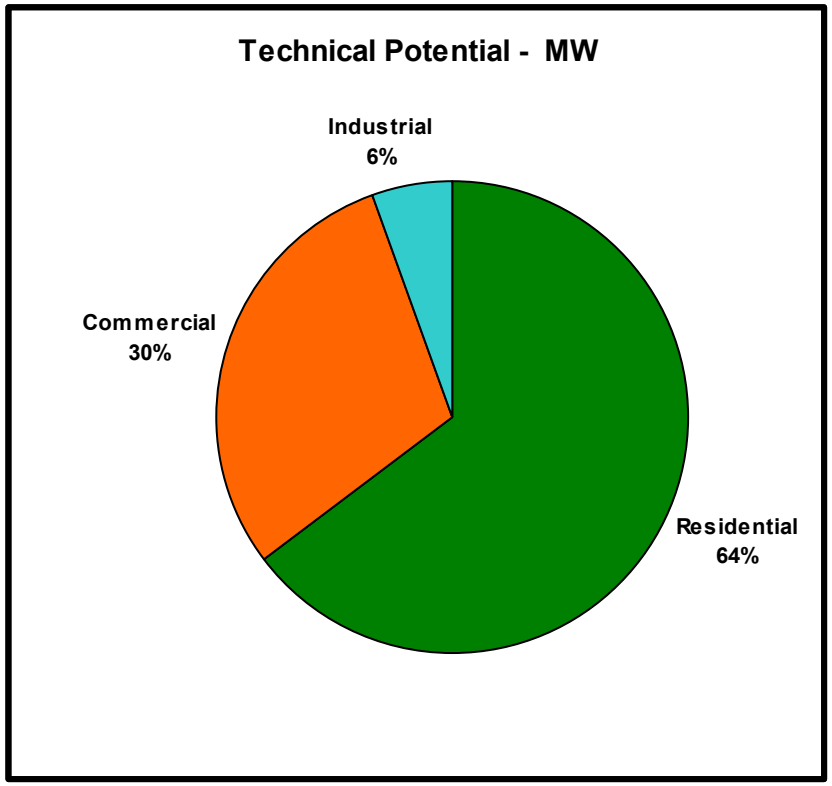
Demand Savings by Sector

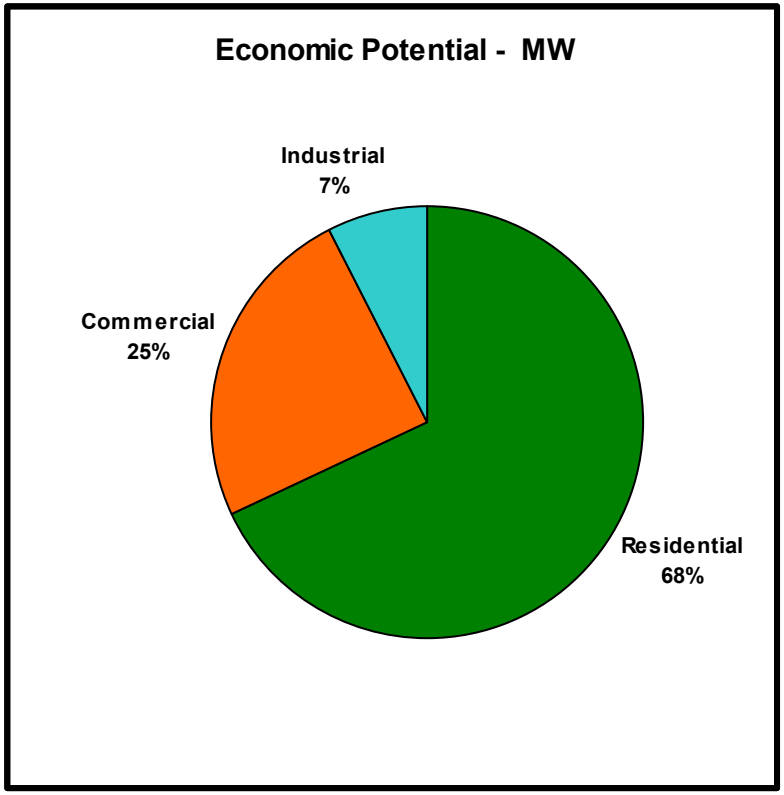


Demand Savings as % of Sector Load



Contribution to Total Demand Savings by Sector





Residential Top Twenty Measures – Economic Potential

Measure Name	Building Type	Meausre TRC	Economic GWh
CFL (15-Watt integral ballast), 1.8 hr/day	Single Family	14.98	1841.92
Variable speed furnace fans (RET)	Single Family	2.11	652.75
CFL (15-Watt integral ballast), 1.8 hr/day	SF Low Income	14.98	602.37
Infiltration Reduction	Single Family	3.19	559.92
Indirect Feedback	Single Family	10.79	531.42
Single Pane Windows to Double Pane with Gas	Single Family	8.06	433.89
Second Refrigerator Recycling	Single Family	26.42	415.48
Proper Refrigerant Charging and Air Flow	Single Family	4.39	363.13
15 SEER Split-System Air Conditioner	Single Family	1.27	352.41
Basement Insulation	Single Family	3.02	296.27
Heat Pump Water Heater (EF=2.5)	Single Family	1.07	278.45
CFL (15-Watt integral ballast), 1.8 hr/day	Multifamily	14.98	268.23
Duct Repair	Single Family	1.57	224.93
Variable speed furnace fans (RET)	SF Low Income	2.11	213.47
Infiltration Reduction	SF Low Income	4.53	200.80
15 SEER Split-System AC Early Replacement	Single Family	3.36	193.55
LEDs w/ Halogen Baseline	Single Family	1.25	191.25
Variable speed furnace fans (RET)	Multifamily	2.11	168.99
Indirect Feedback	SF Low Income	10.06	161.89
HE Refrigerator - Energy Star	Single Family	1.01	140.18

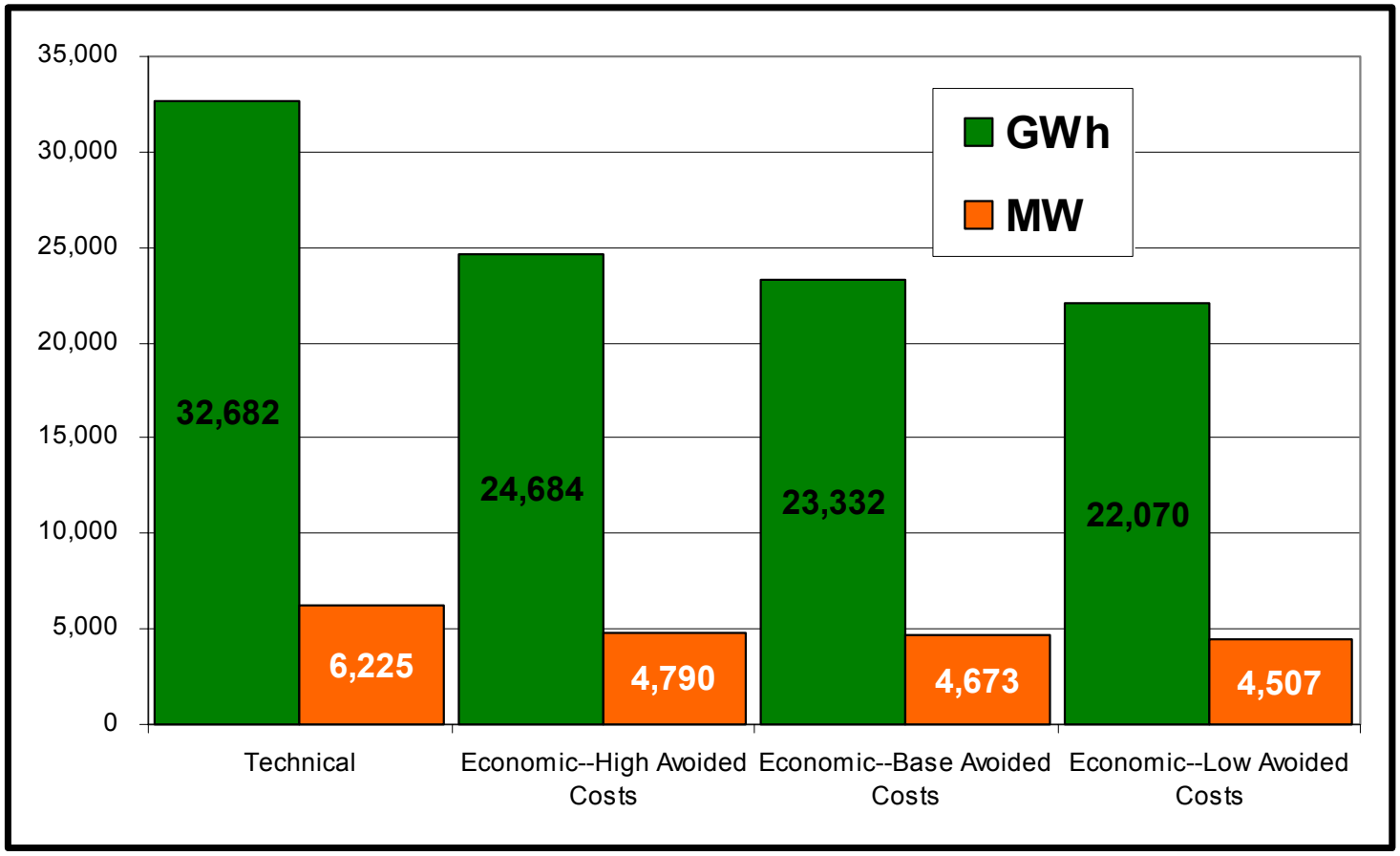
Commercial Top Twenty Measures – Economic Potential

Measure Name	Measure TRC	Economic GWh
CFL Screw-in 18W	8.10	1195.26
CFL Hardwired, Modular 18W	3.53	753.63
Screw-in LED--Base Incandescent	1.17	469.35
PC Network Power Management Enabling	8.34	310.67
Energy Star or Better Monitor - CRT	159.22	264.65
High Pressure Sodium 250W Lamp	1.24	228.53
Variable Speed Drive Control, 5 HP	2.28	223.06
Fiber Optic Display Lighting	14.41	212.53
Energy Star or Better PC	37.73	212.50
Outdoor Lighting Controls (Photocell/Timeclock)	5.03	179.06
Hardwired LED fixture--Base Incandescent	1.11	165.07
LED Outdoor Area Lighting	1.14	160.93
Demand Defrost Electric	19.80	143.81
DX Packaged System, EER=11.5, 10 tons	1.21	129.20
Data Center Improved Operations	214.79	127.22
Ceiling/roof Insulation - DX	12.19	125.46
Window Film (Standard)	1.93	107.54
Economizer	0.39	102.21
Aerosol Duct Sealing - DX	8.41	102.18
High-efficiency fan motors	0.82	101.03

Industrial Top Twenty Measures – Economic Potential

Measure Name	Meausre TRC	Economic GWh
Fans - Controls	2.10	273.30
Pumps - System Optimization	3.02	247.34
Pumps - Controls	8.04	200.39
Fans - System Optimization	1.34	162.24
Pumps - Sizing	6.09	160.59
RET 2L4' Premium T8, 1EB	2.53	135.73
Pumps - ASD (100+ hp)	1.85	100.98
Compressed Air - System Optimization	7.17	100.29
Optimization Refrigeration	1.69	83.64
Pumps - O&M	12.25	80.80
Efficient electric melting	2.78	76.04
Pumps - ASD (6-100 hp)	8.21	71.16
Extruders/injection Moulding-multipump	2.01	53.65
Compressed Air-O&M	10.70	53.46
Centrifugal Chiller, 0.51 kW/ton, 500 tons	3.73	52.89
Fans- Improve components	5.81	52.77
Comp Air - ASD (6-100 hp)	7.75	41.08
Drives - Process Controls (batch + site)	1.12	39.83
Fans - ASD (100+ hp)	1.96	38.24
Efficient Refrigeration - Operations	9.56	37.93

Avoided Cost Scenario Results – Electric - Base, -20%, +50%



Avoided Cost Scenarios – Electric (continued)

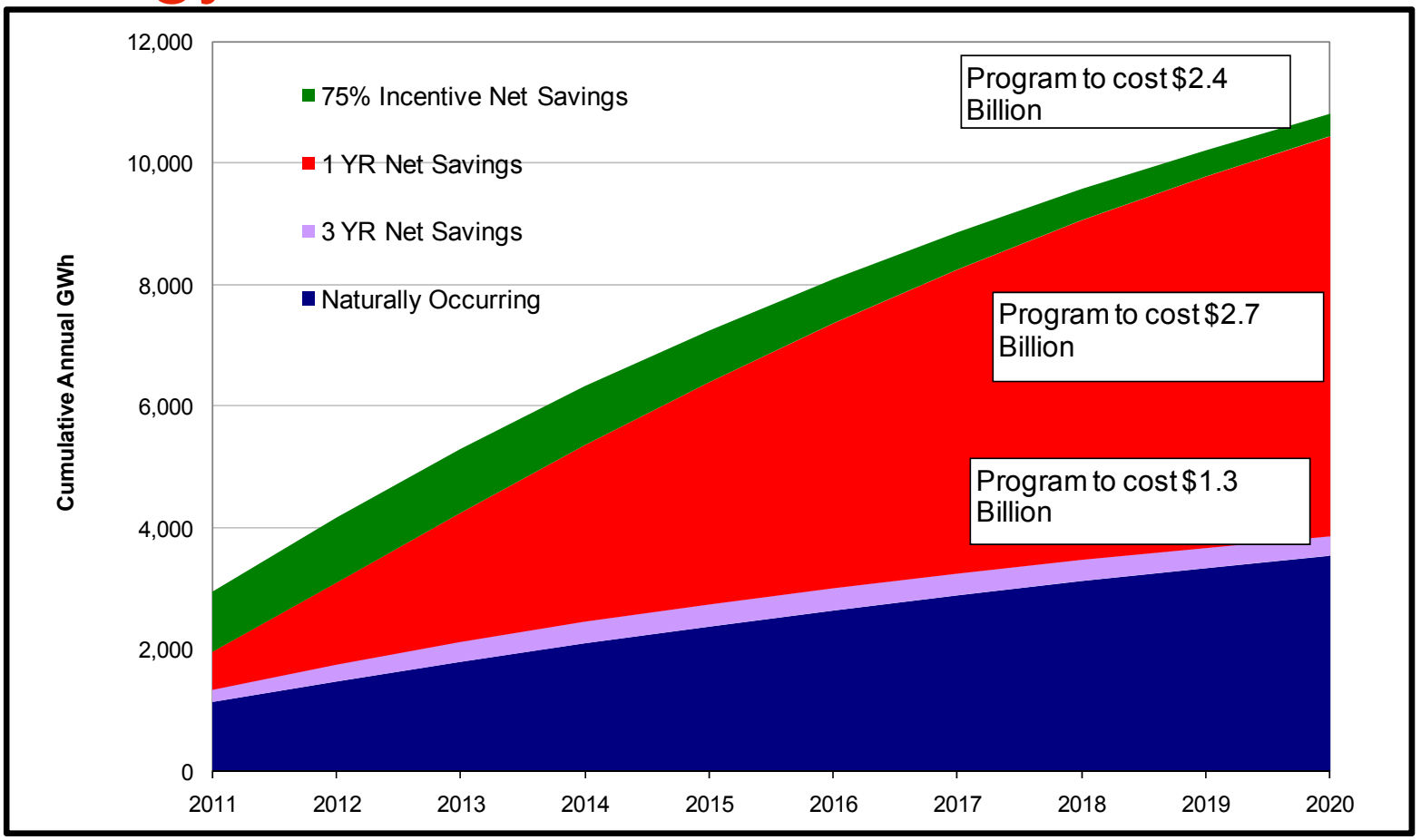
	Base	Technical	Economic--High Avoided Costs	Economic--Base Avoided Costs	Economic--Low Avoided Costs
Energy					
GWh	92,556	32,682	24,684	23,332	22,070
% of consumption		35%	27%	25%	24%
% of Technical			76%	71%	68%
% of Economic--Base Avoided Costs			**106%**	**100%**	**95%**
Peak Demand					
MW	17,139	6,225	4,790	4,673	4,507
% of consumption		36%	28%	27%	26%
% of Technical			77%	75%	72%
% of Economic--Base Avoided Costs			**103%**	**100%**	**96%**

Achievable Potential -Electricity

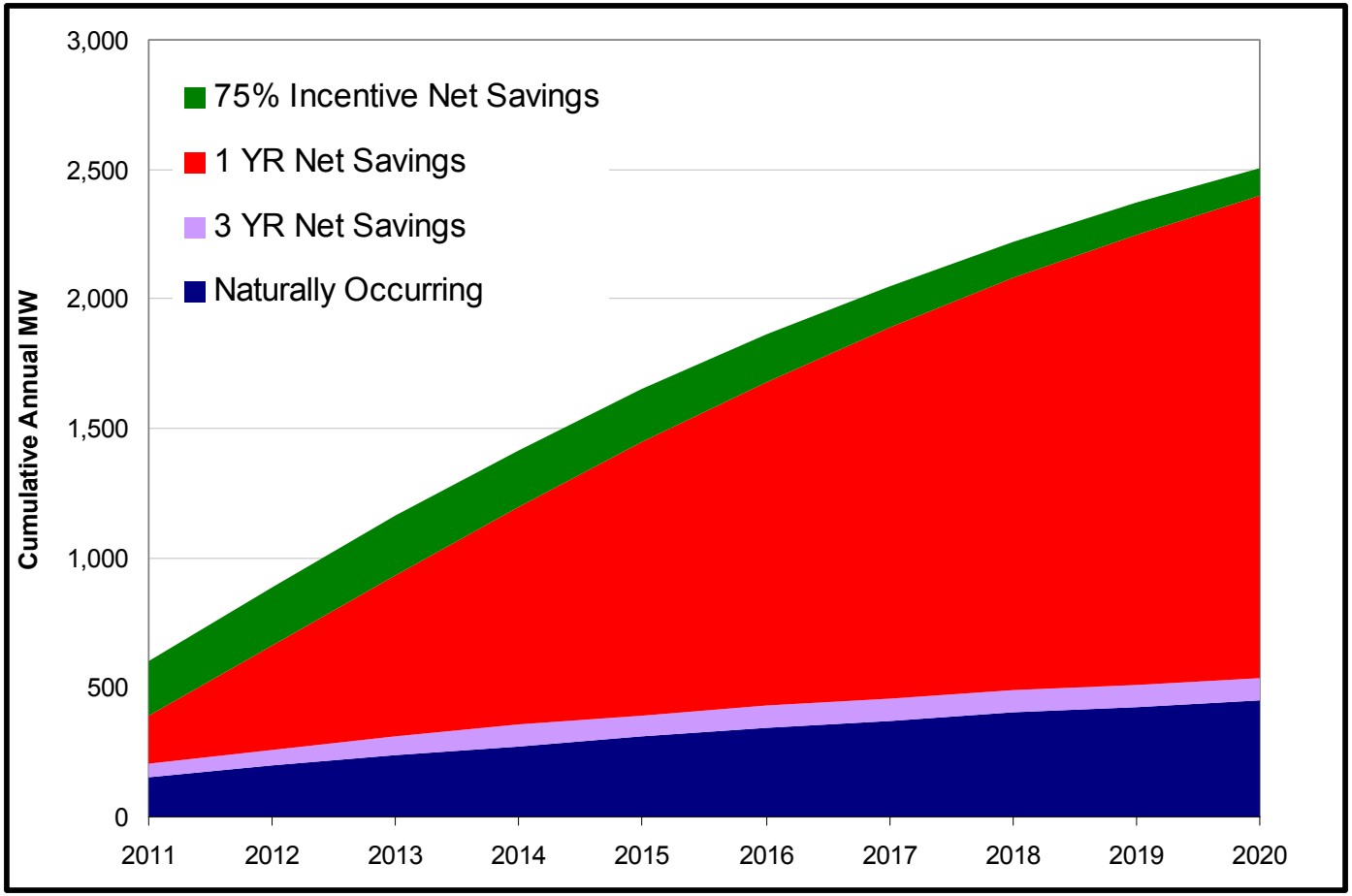
Three Scenarios for Achievable Potential

- **One year payback -** base incentive levels are set to a one year payback, moderately aggressive administration budgets.
- **Three year payback** - base incentive levels are set to a three year payback, modest program administration budgets.
- **KEMA Norm or 75% Incentive** – Incentives cover 75% of incremental cost, program administration budgets adjusted accordingly.

Achievable Electric Savings – Energy, All Scenarios



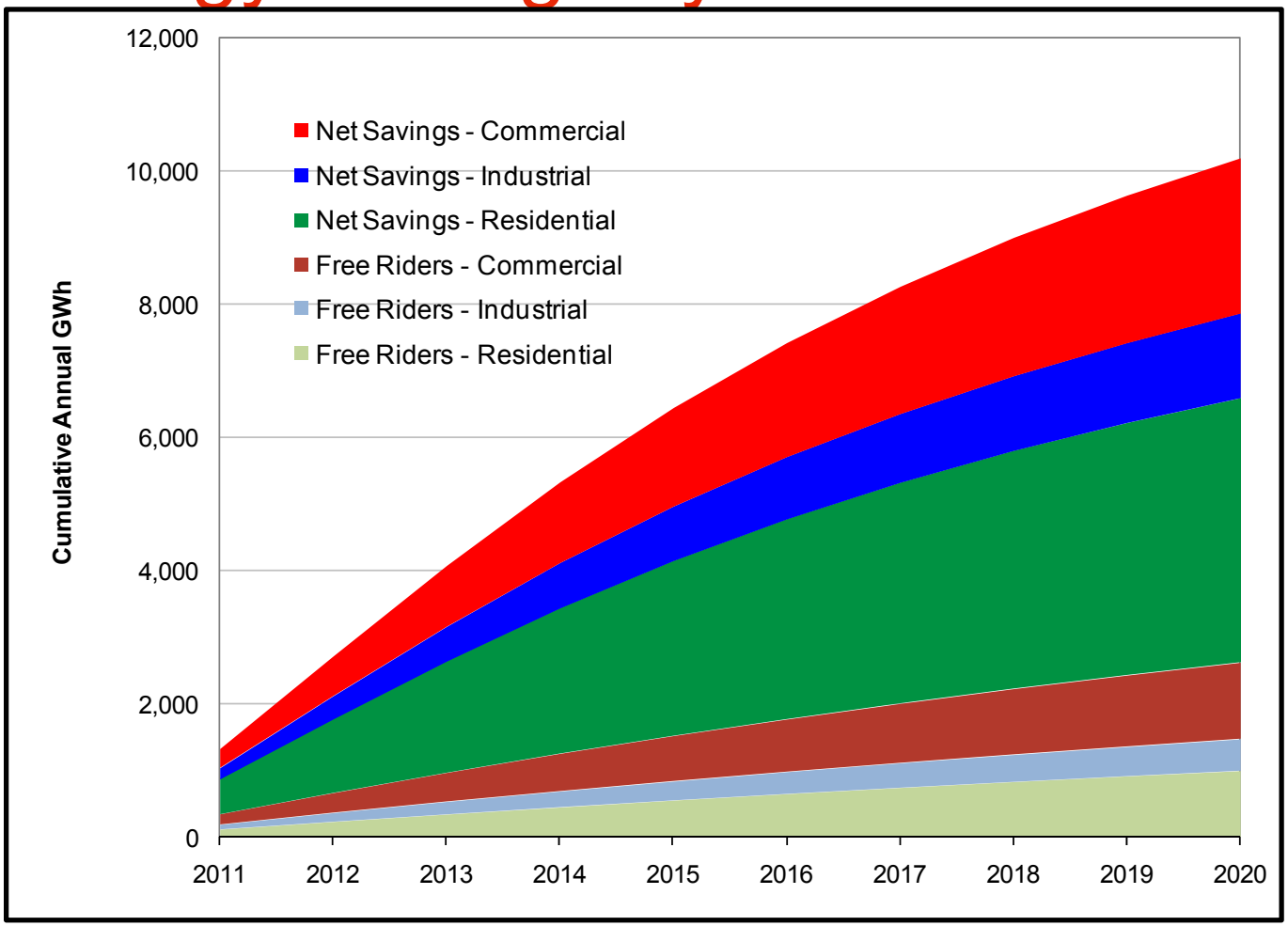
Achievable Electric Savings – Demand, All Scenarios



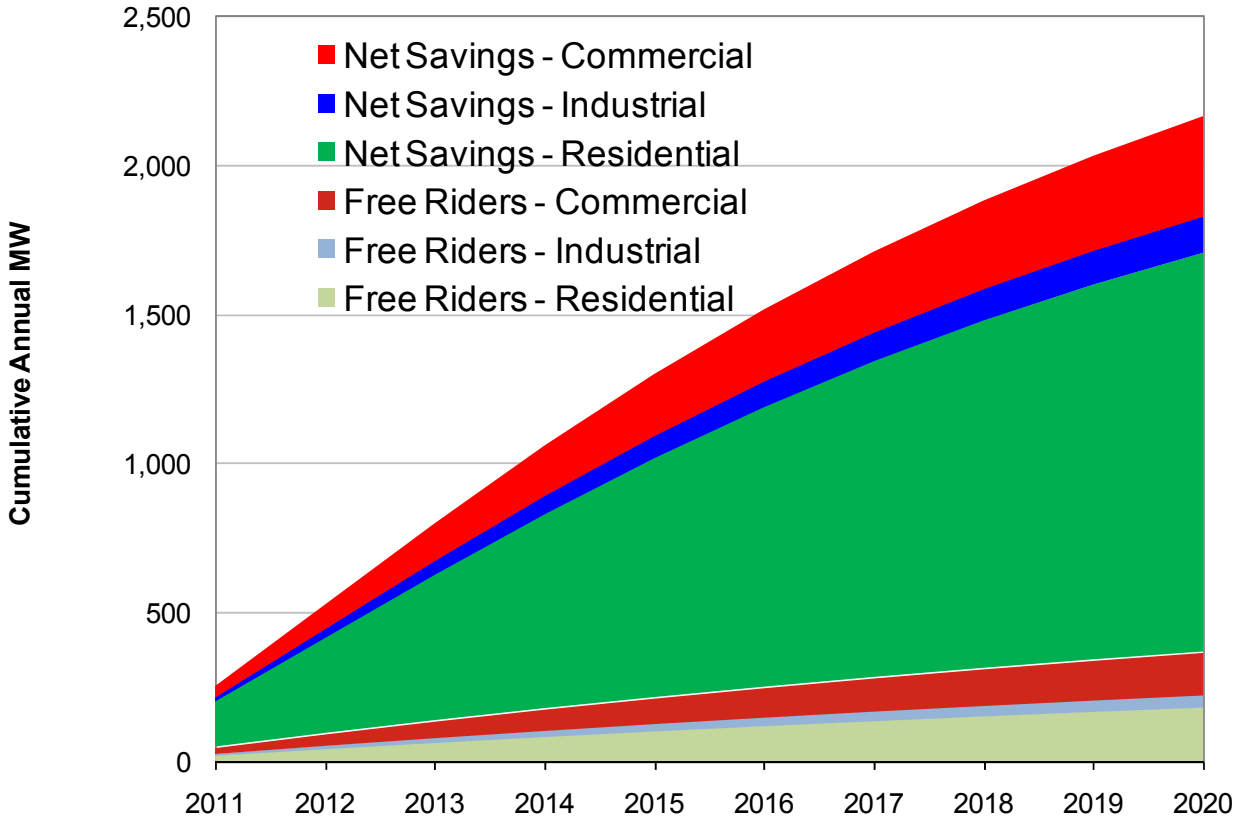
Summary Results – All Scenarios

Result - Programs	3 YR Payback	1 YR Payback	75% Incentive
Gross Energy Savings - GWh	6,406	9,696	10,185
Gross Peak Demand Savings - MW	1,175	2,259	2,169
Net Energy Savings - GWh	3,281	6,571	7,561
Net Peak Demand Savings - MW	779	1,863	1,801
Program Costs - Real, $ Million			
Administration	$193	$246	$317
Marketing	$223	$223	$221
Incentives	$597	$2,148	$1,723
Total	$1,013	$2,617	$2,260
PV Avoided Costs	$2,797	$6,196	$6,771
PV Annual Program Costs (Adm/Mkt)	$334	$377	$433
PV Net Measure Costs	$927	$2,331	$1,977
Net Benefits	$1,536	$3,488	$4,361
TRC Ratio	2.22	2.29	2.81

75% Incentive Scenario Energy Savings by Sector



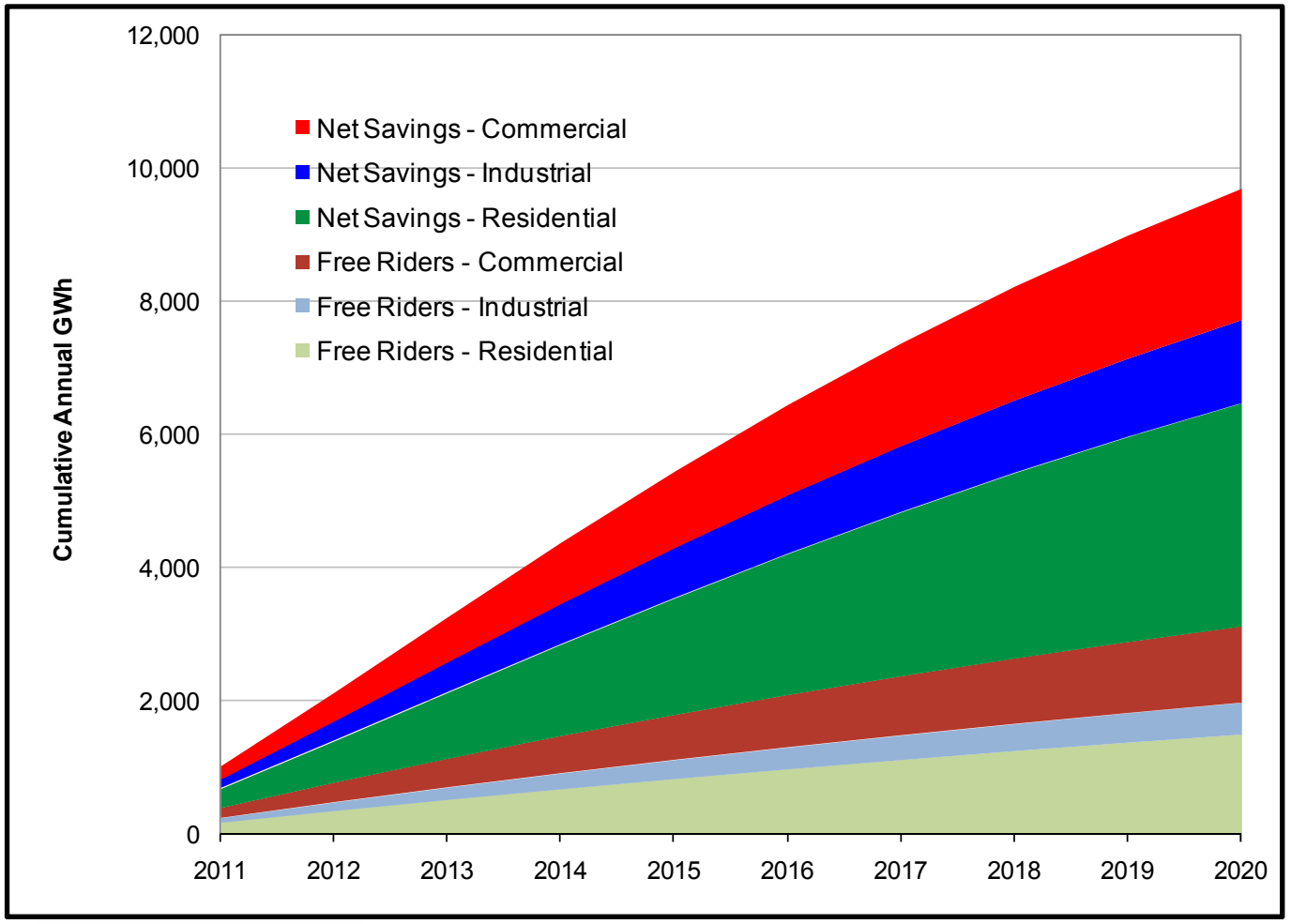
75% Incentive Scenario Demand Savings by Sector



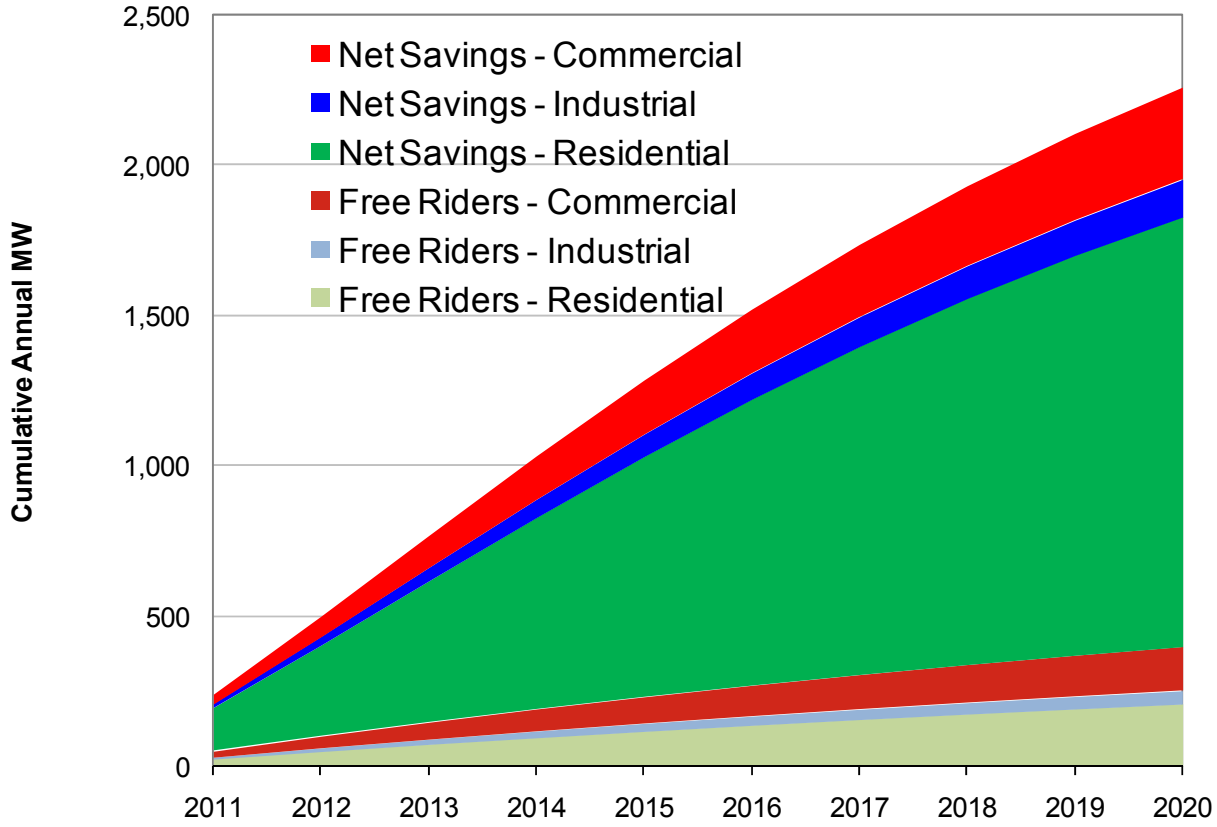
75% Incentive Scenario Detail

Results - 75% Incentive	Program Scenario: 2011 - 2020			
	Residential	Commercial	Industrial	All Programs
Gross Energy Savings - GWh	4,969	3,471	1,745	10,185
Gross Peak Demand Savings - MW	1,520	480	170	2,169
Net Energy Savings - GWh	3962	2328	1,272	7,561
Net Peak Demand Savings - MW	1338	338	125	1,801
Program Costs - Real, $ Million				
Administration	$196,045,734	$53,413,851	$67,198,307	$316,657,892
Marketing	$65,522,074	$100,300,000	$55,413,542	$221,235,616
Incentives	$945,968,901	$559,601,124	$217,032,139	$1,722,602,164
Total	$1,207,536,709	$713,314,976	$339,643,988	$2,260,495,673
PV Avoided Costs	$4,165,622,137	$1,754,025,981	$851,680,303	$6,771,328,421
PV Annual Program Costs (Adm/Mkt)	$209,523,856	$124,195,918	$99,260,721	$432,980,494
PV Net Measure Costs	$1,097,178,519	$613,353,484	$266,565,489	$1,977,097,492
Net Benefits	$2,858,919,762	$1,016,476,580	$485,854,093	$4,361,250,435
TRC Ratio	3.19	2.38	2.33	2.81

1 Year Payback
Energy Savings by Sector



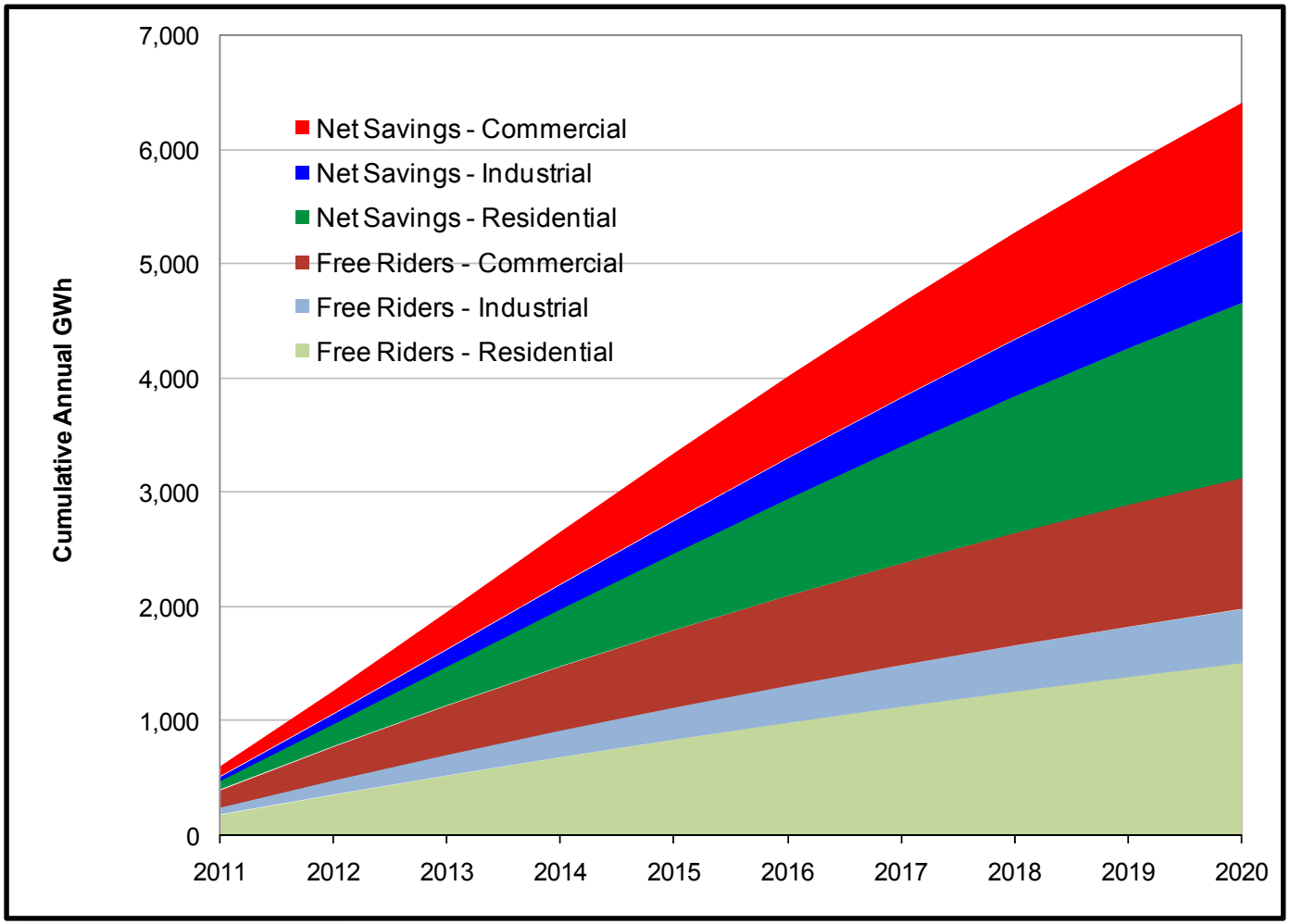
1 Year Payback Scenario Demand Savings by Sector



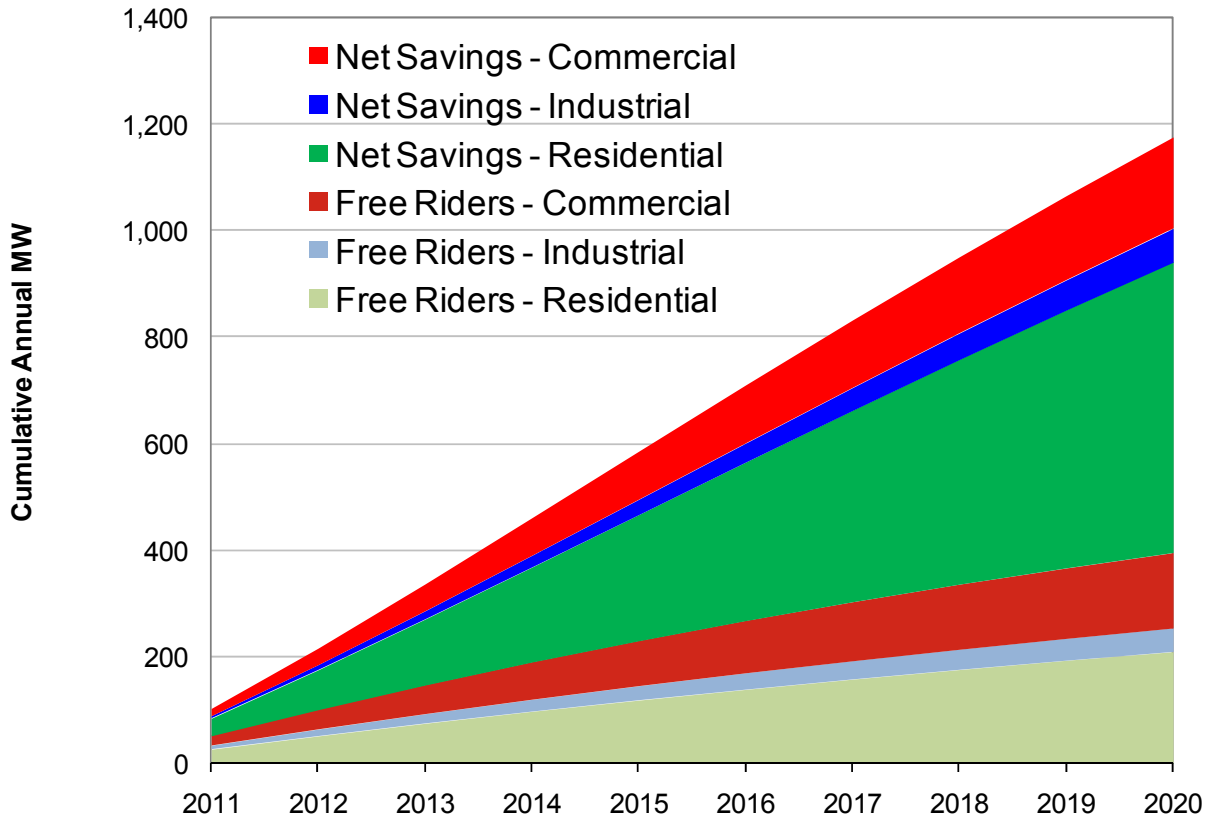
1 Year Payback Scenario Detail

Result - 1 Year Payback	Program Scenario: 2011 - 2020			
	Residential	Commercial	Industrial	All Programs
Gross Energy Savings - GWh	4,860	3,114	1,722	9,696
Gross Peak Demand Savings - MW	1,643	446	170	2,259
Net Energy Savings - GWh	3352	1971	1,248	6,571
Net Peak Demand Savings - MW	1433	304	126	1,863
Program Costs - Real, $ Million				
Administration	$139,492,802	$47,331,839	$59,272,264	$246,096,905
Marketing	$67,202,074	$100,300,000	$55,413,542	$222,915,616
Incentives	$1,310,989,486	$606,110,903	$230,728,415	$2,147,828,804
Total	$1,517,684,363	$753,742,742	$345,414,221	$2,616,841,326
PV Avoided Costs	$3,870,474,615	$1,494,748,329	$831,171,000	$6,196,393,944
PV Annual Program Costs (Adm/Mkt)	$165,343,949	$119,357,581	$92,781,203	$377,482,733
PV Net Measure Costs	$1,401,801,129	$634,969,657	$294,275,112	$2,331,045,898
Net Benefits	$2,303,329,538	$740,421,090	$444,114,686	$3,487,865,313
TRC Ratio	2.47	1.98	2.15	2.29

3 Year Payback Scenario
Energy Savings by Sector



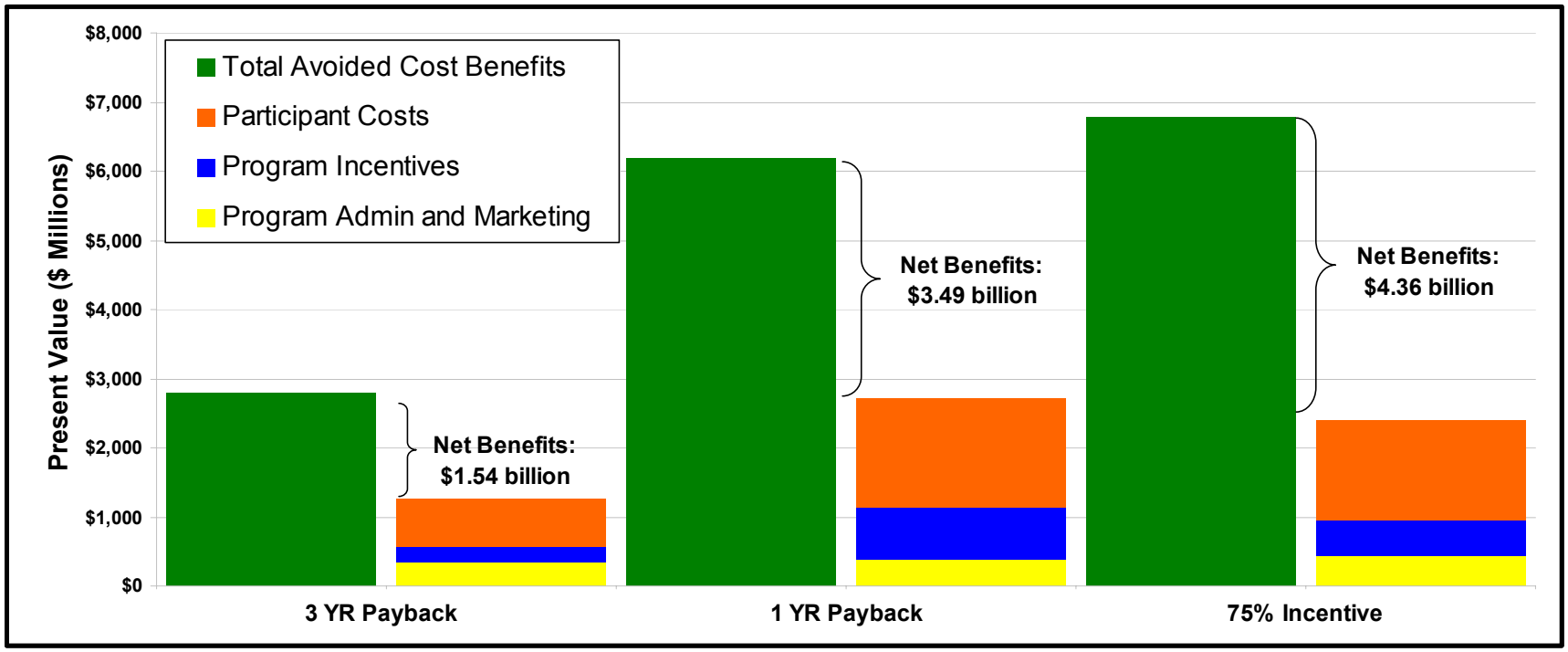
3 Year Payback Scenario Demand Savings by Sector



3 Year Payback Scenario Detail

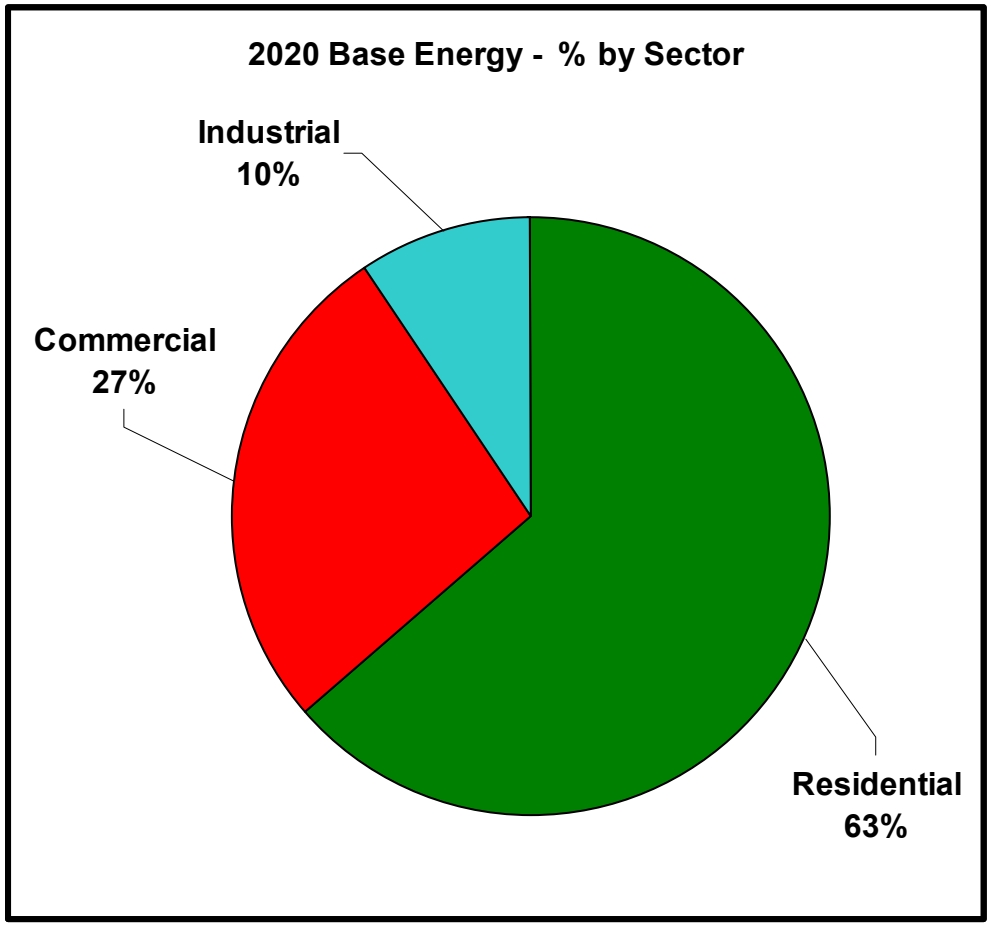
Result - 3 Year Payback	Program Scenario: 2011 - 2020			
	Residential	Commercial	Industrial	All Programs
Gross Energy Savings - GWh	3,045	2,259	1,101	6,406
Gross Peak Demand Savings - MW	754	313	108	1,175
Net Energy Savings - GWh	1538	1116	627	3,281
Net Peak Demand Savings - MW	545	170	63	779
Program Costs - Real, $ Million				
Administration	$92,738,156	$43,092,806	$57,214,821	$193,045,783
Marketing	$67,202,074	$100,300,000	$55,413,542	$222,915,616
Incentives	$352,886,177	$196,001,797	$48,036,816	$596,924,790
Total	$512,826,408	$339,394,603	$160,665,178	$1,012,886,189
PV Avoided Costs	$1,566,700,907	$829,032,115	$400,942,621	$2,796,675,643
PV Annual Program Costs (Adm/Mkt)	$127,953,210	$115,576,622	$89,989,960	$333,519,792
PV Net Measure Costs	$513,947,188	$291,822,283	$121,377,976	$927,147,447
Net Benefits	$924,800,508	$421,633,210	$189,574,685	$1,536,008,404
TRC Ratio	2.44	2.03	1.90	2.22

Electric Benefit Cost Summary

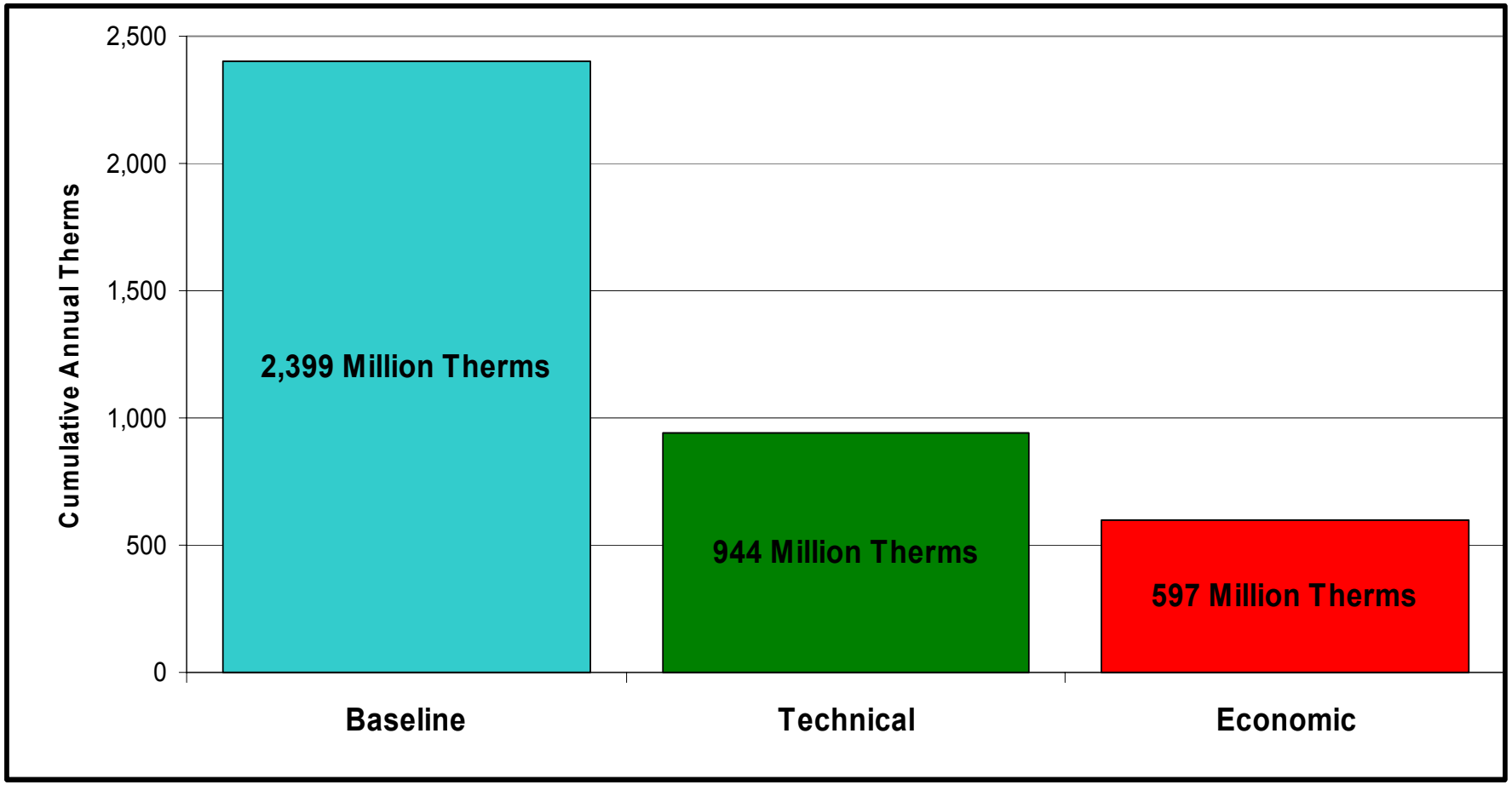


Natural Gas –Technical and Economic Potential

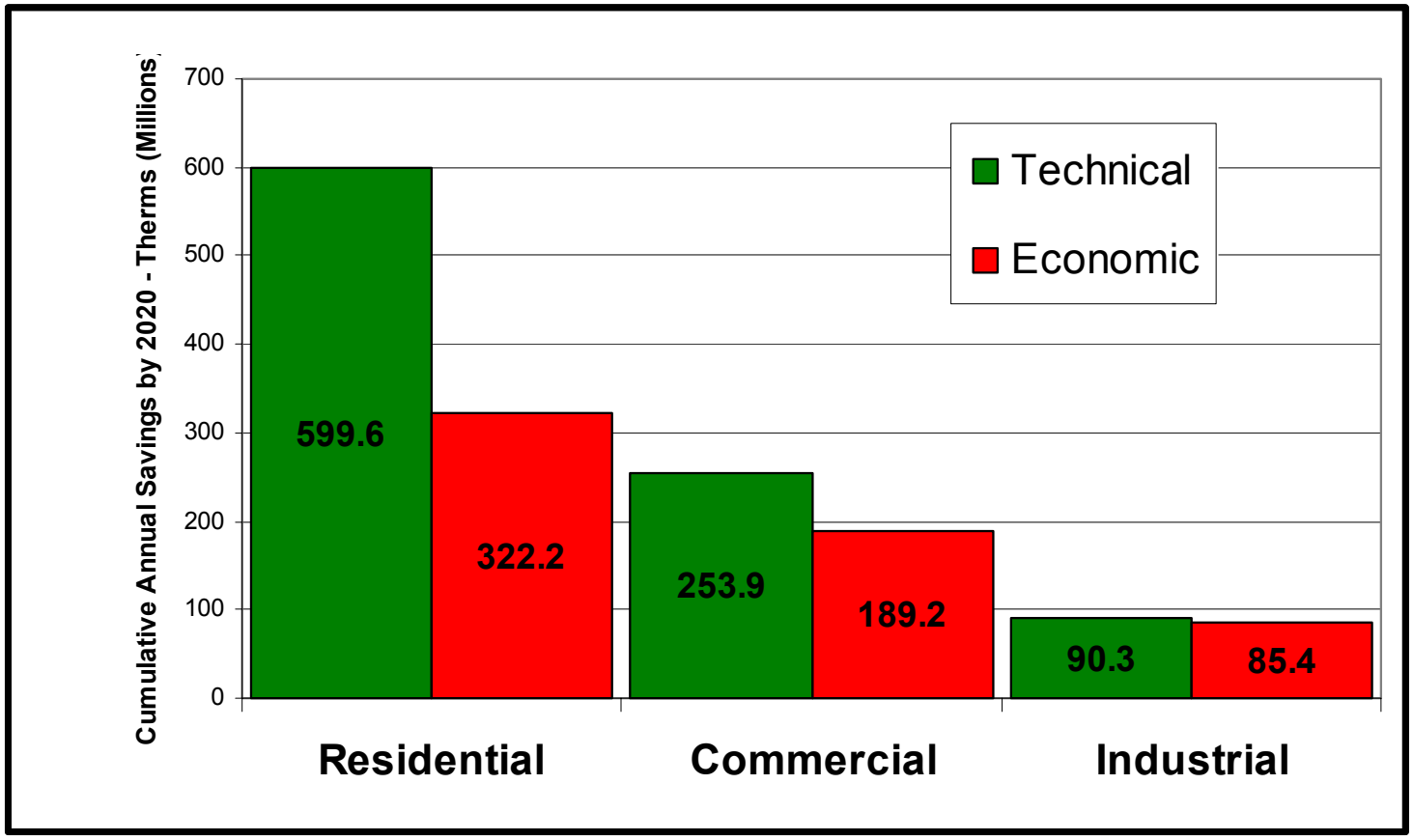
Sector Contribution to 2020 Baseline Natural Gas Load



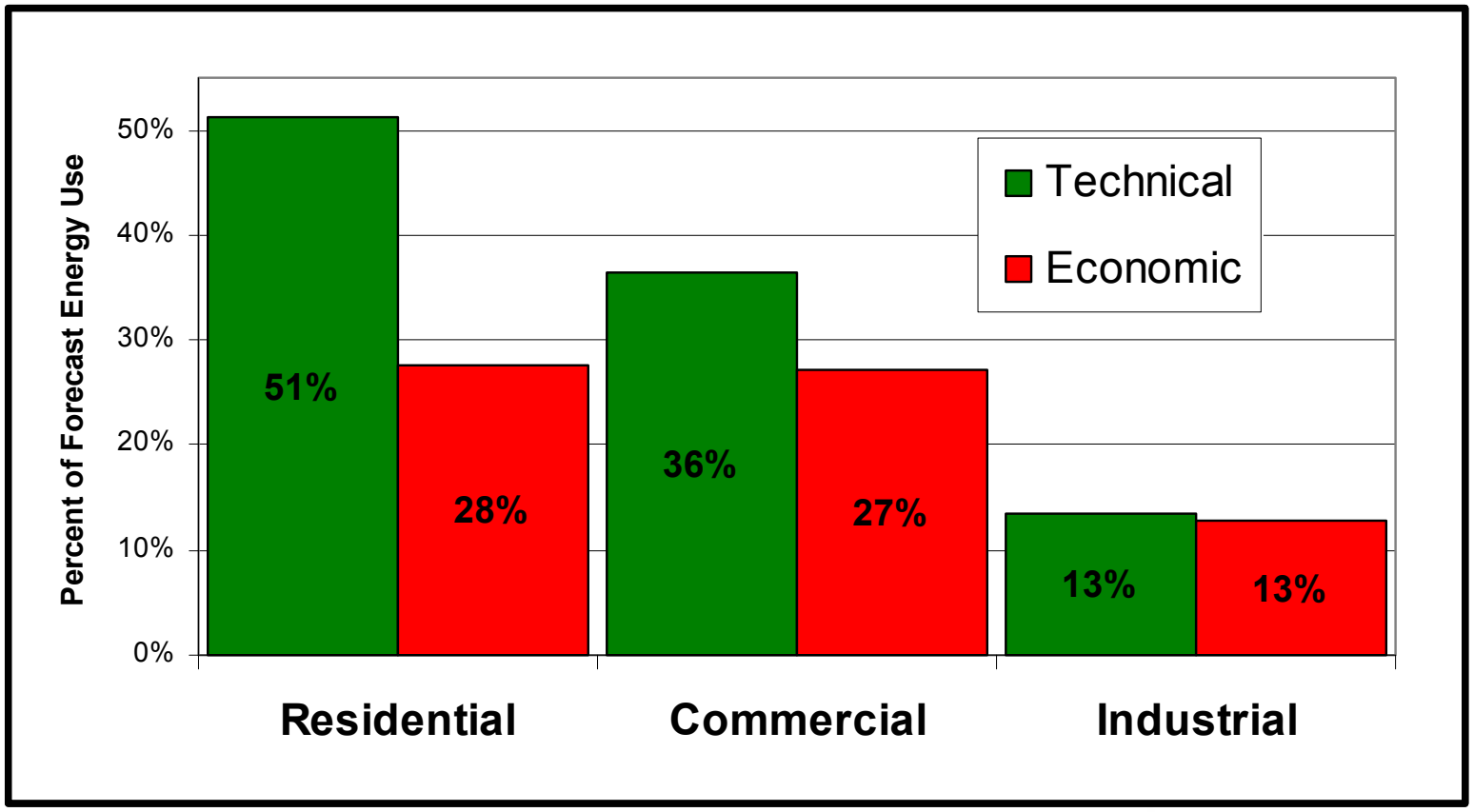
Natural Gas Potential Summary



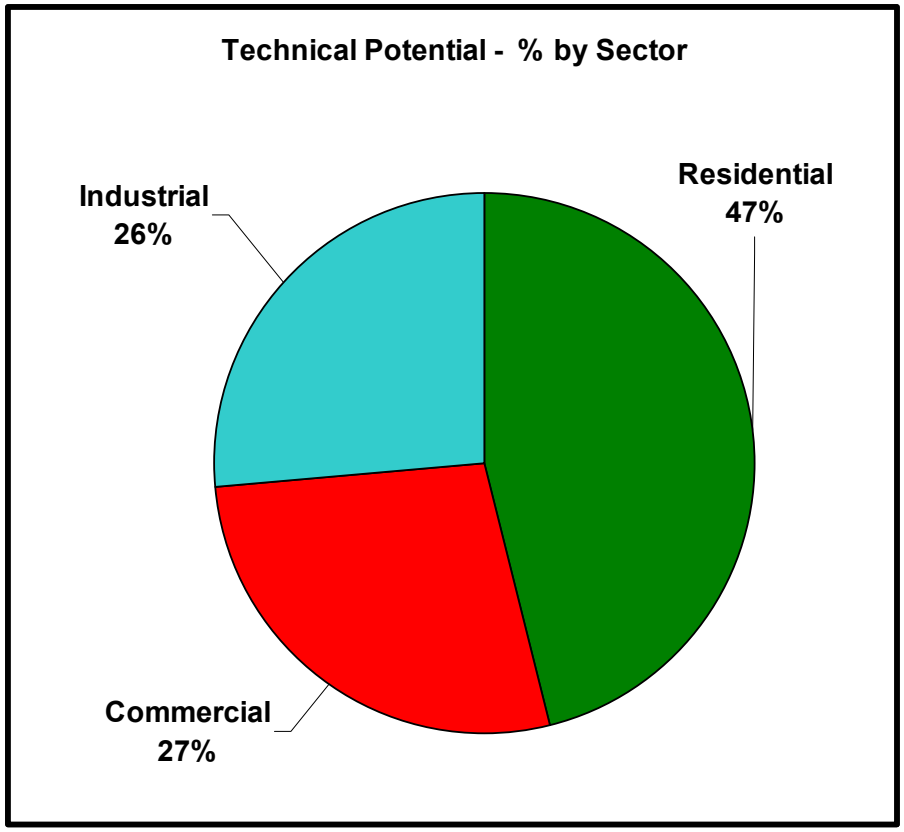
Energy Savings Contribution by Sector (million therms)

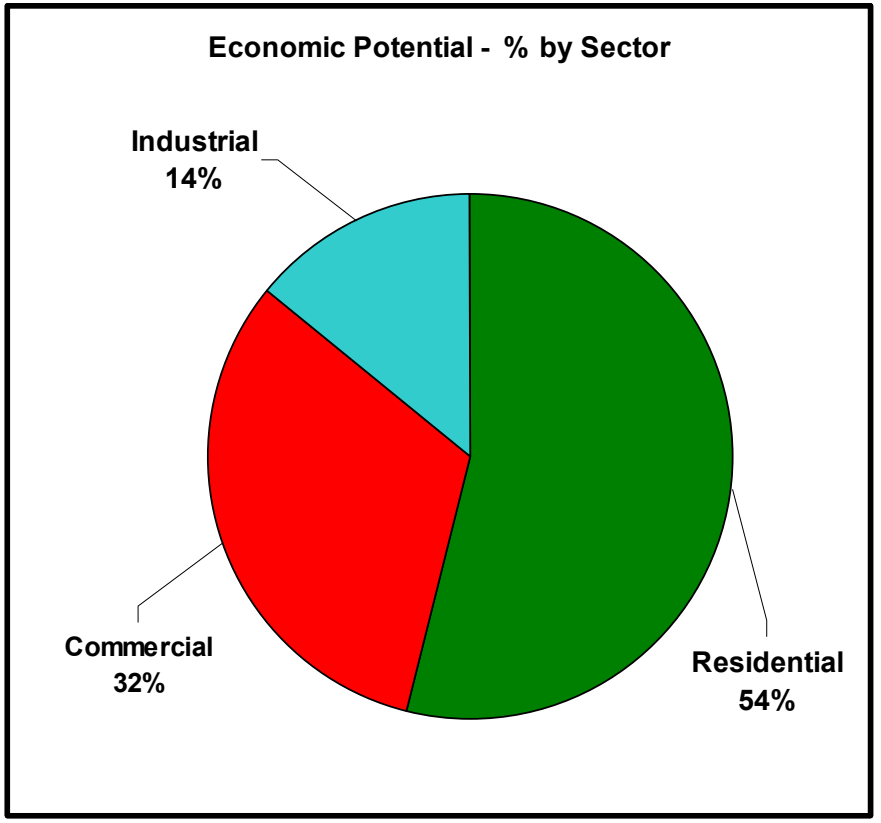


Natural Gas Saving as % of Sector Load



Contribution to Total Gas Savings Potential by Sector





Residential Top Twenty Measures – Economic Potential

Measure Name	Building Type	TRC	Economic DTh
Single Pane to Double Pane with Gas	Single Family	3.02	4,918,436
Conservation- Opower	Single Family	1.83	2,455,643
Single Pane to Double Pane with Gas	SF Low Income	3.77	1,765,297
Energy Star Water Heater (EF = .67)	Single Family	2.16	1,700,870
Basement insulation R-13 (Furnace)	Single Family	1.04	1,529,677
Comprehensive Shell Air Sealing - Inf. Reduction	Single Family	1.27	1,327,130
Furnace Diagnostic Testing, Repair and Maintenance	Single Family	1.18	1,206,852
ENERGY STAR Programmable Thermostat	Single Family	2.39	1,041,386
Faucent Aerators	Single Family	2.87	891,142
Conservation- Opower	SF Low Income	1.88	828,058
Drain Water Heat Recovery (GFX)	Single Family	1.05	610,700
Basement insulation R-13 (Furnace)	SF Low Income	1.28	546,972
Self Install Weatherization	Single Family	7.85	503,351
Energy Star Water Heater (EF = .67)	SF Low Income	1.89	486,201
Comprehensive Shell Air Sealing - Inf. Reduction	SF Low Income	1.19	407,948
Furnace Diagnostic Testing, Repair and Maintenance	SF Low Income	1.11	369,403
Faucent Aerators	SF Low Income	3.83	338,009
ENERGY STAR Programmable Thermostat	SF Low Income	2.36	336,141
Pipe Wrap	Single Family	4.88	331,642
Single Pane to Double Pane with Gas	Multifamily	15.80	330,386

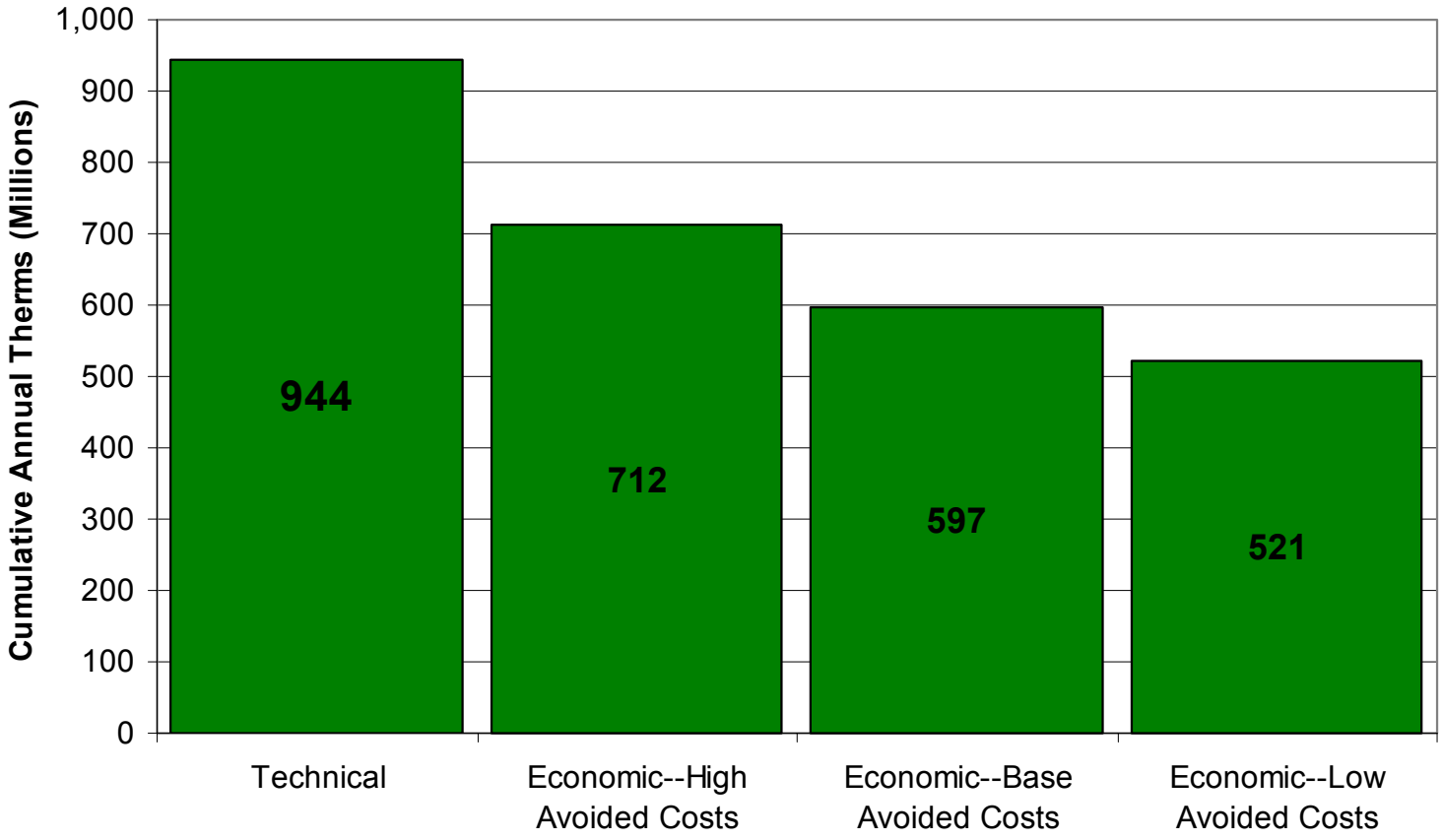
Commercial Top Twenty Measures – Economic Potential

Measure Name	TRC	Economic DTh
Clock / Programmable Thermostat	1.89	3,645,090
Tankless Water Heater	6.77	3,316,832
High Efficiency (Power Burner/ Premium) Boiler 95% efficiency (in situ base=82%)	1.11	2,098,991
Demand controlled ventilation (DCV)	1.17	1,953,369
Insulation (ceiling)	4.02	1,187,165
Condensing Water Heater (gas, 95% thermal efficiency)	40.63	1,084,253
Installation of Energy Management Systems (EMS)	0.56	984,208
Insulation (wall)	1.62	774,723
Radiant heater	12.19	681,269
Energy Star Fryer	2.69	644,666
Condensing unit heaters	7.48	572,036
High Efficiency Windows (Multiple Glazed, Low Emissivity)	0.28	471,938
Demand controlled circulating systems	38.41	441,726
Stack Heat Exchanger	3.13	301,616
Demand controlled circulating systems	10.31	290,518
Energy Star Steamer	2.52	242,861
Demand controlled circulating systems	28.10	151,208
Retrocommissioning	0.75	122,945
Hot water temperature reset	15.47	45,766
Boiler Tune-Up	2.42	32,341
High-Efficiency Griddle	0.22	31,250

Industrial Top Twenty Measures – Economic Potential

Measure Name	TRC	Economic DTh
Thermally activated heat pump/chiller	3.64	1,210,871
Improved insulation	6.76	1,063,589
Process Controls & Management	4.12	915,482
Efficient burners	4.64	868,117
Steam trap maintenance	2.55	666,243
Load control	17.50	578,394
Automatic steam trap monitoring	8.27	340,894
Maintain boilers	92.32	295,099
Process integration	1.19	258,649
Improved process control	14.02	245,702
Fouling control	4.66	193,220
Heat Recovery	1.75	181,818
Thermal oxidizers	3.01	152,329
Improve ceiling insulation	2.21	136,735
Oxyfuel	2.58	136,351
Improved separation processes	3.28	125,856
Water treatment	4.55	122,068
Flare gas controls and recovery	4.77	117,690
Flue gas heat recovery/economizer	2.80	107,676
Install high efficiency (95%) condensing furnace/boiler	3.92	105,695

Avoided Cost Scenario Results – Gas – Base, -20%, +50%

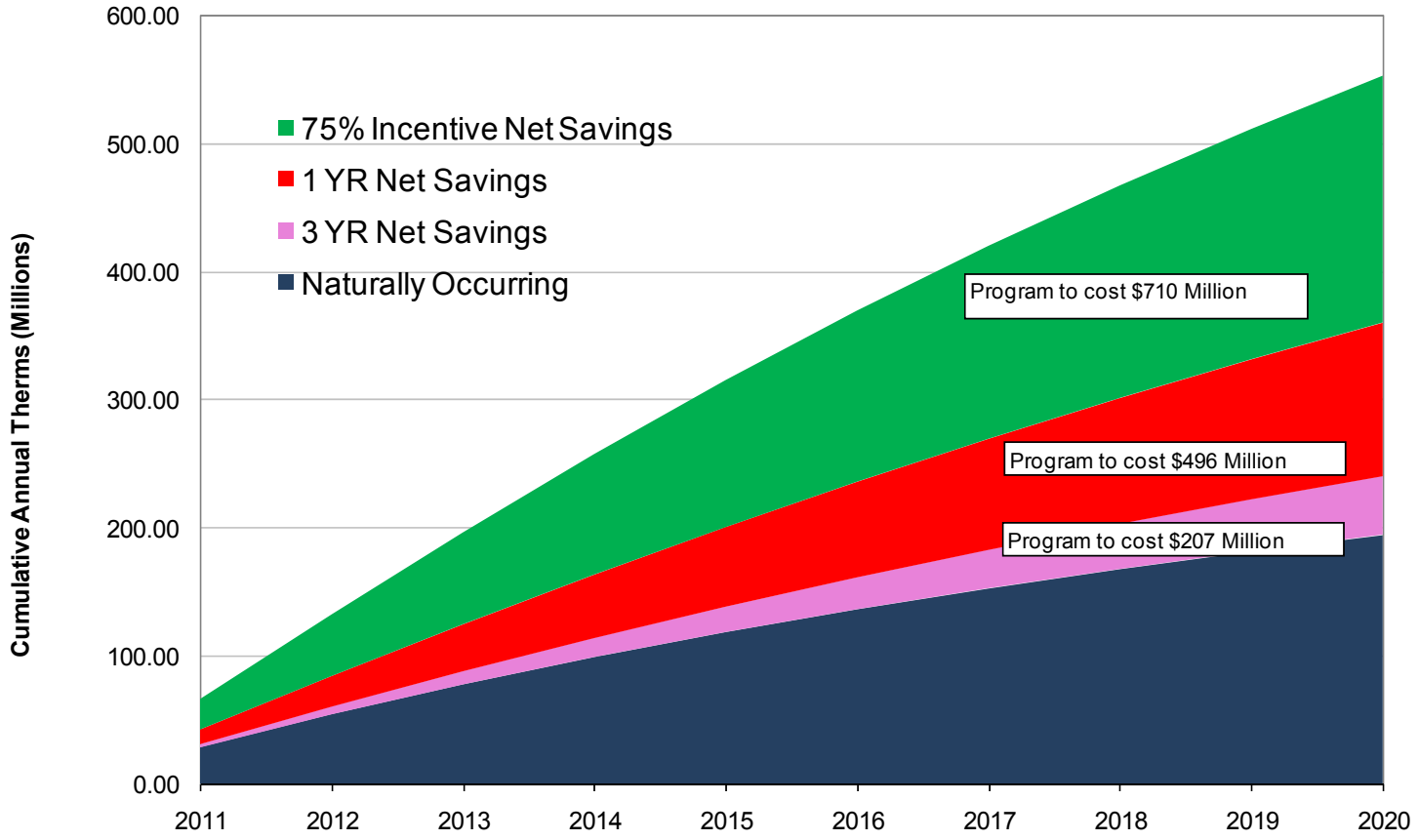


Avoided Cost Scenarios – Gas (continued)

Base		Technical	Economic--High Avoided Costs	Economic--Base Avoided Costs	Economic--Low Avoided Costs
Million therms	2,538	944	712	597	521
% of consumption		37%	28%	24%	21%
% of Technical			75%	63%	55%
% of Economic--Base Case			**119%**	**100%**	**87%**

Achievable Potential

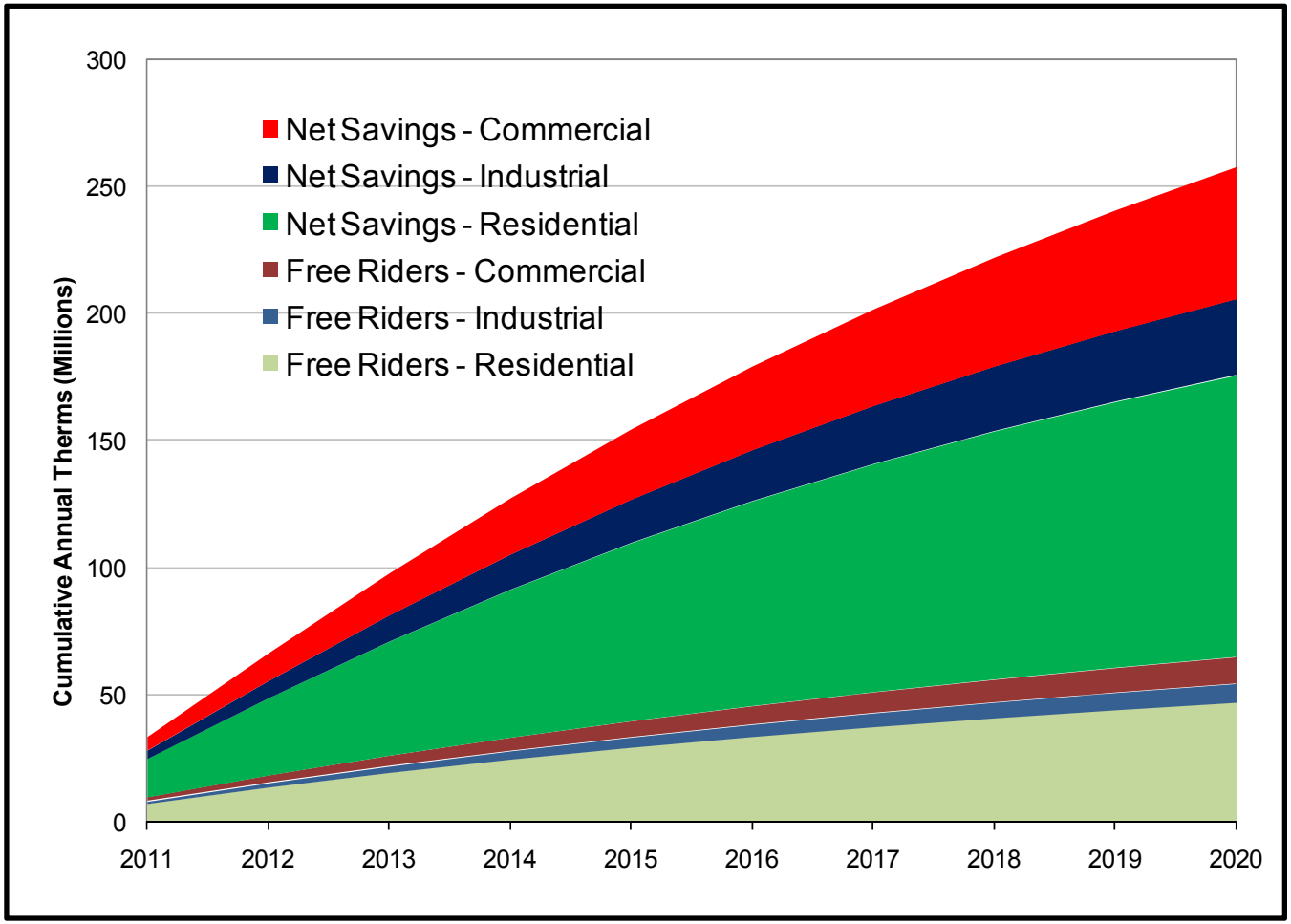
Achievable Gas Potential
All Scenarios



Summary Results – All Scenarios

Result - All Scenarios	3 YR Payback	1 YR Payback	75% Incentive
Gross Energy Savings - Therms (Millions)	110.8	184.8	257.5
Net Energy Savings - Therms (Millions)	45.8	119.9	192.6
Program Costs - Real, $ Million			
Administration	$64	$87	$128
Marketing	$34	$34	$34
Incentives	$27	$320	$534
Total	$124	$440	$695
PV Avoided Costs	$331	$890	$1,463
PV Annual Program Costs (Adm/Mkt)	$79	$97	$131
PV Net Measure Costs	$129	$398	$578
Net Benefits	$124	$395	$754
TRC Ratio	1.60	1.80	2.06

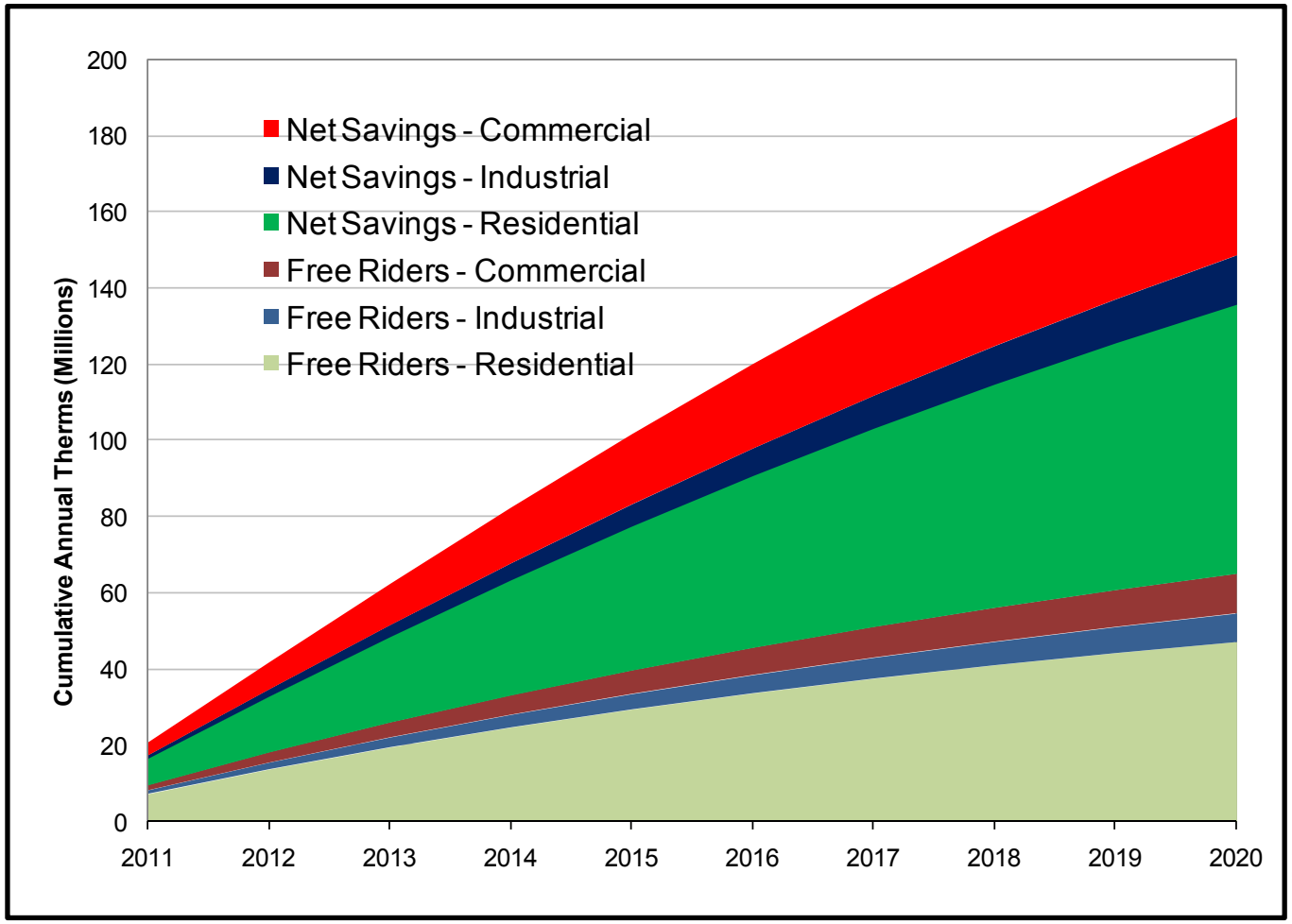
75% Incentive Scenario
Gas Savings by Sector



75% Incentive Scenario Detail

Result - Programs	Program Scenario: 2011 - 2020			
	Residential	Commercial	Industrial	All Programs
Gross Energy Savings - Therms (Millions)	158	62	37	257
Net Energy Savings - Therms (Millions)	111	52	30	193
Program Costs - Real, $				
Administration	$97,332,617	$22,605,448	$8,052,714	$127,990,779
Marketing	$10,058,561	$17,251,421	$6,256,368	$33,566,349
Incentives	$388,165,446	$110,640,993	$34,826,977	$533,633,416
Total	$495,556,624	$150,497,861	$49,136,059	$695,190,545
PV Avoided Costs	$851,147,211	$387,536,624	$224,787,580	$1,463,471,414
PV Annual Program Costs (Adm/Mkt)	$87,426,989	$32,187,867	$11,535,092	$131,149,948
PV Net Measure Costs	$417,711,042	$122,133,303	$38,584,536	$578,428,881
Net Benefits	$346,009,179	$233,215,454	$174,667,952	$753,892,586
TRC Ratio	1.68	2.51	4.49	2.06

1 Year Payback Scenario
Gas Savings by Sector

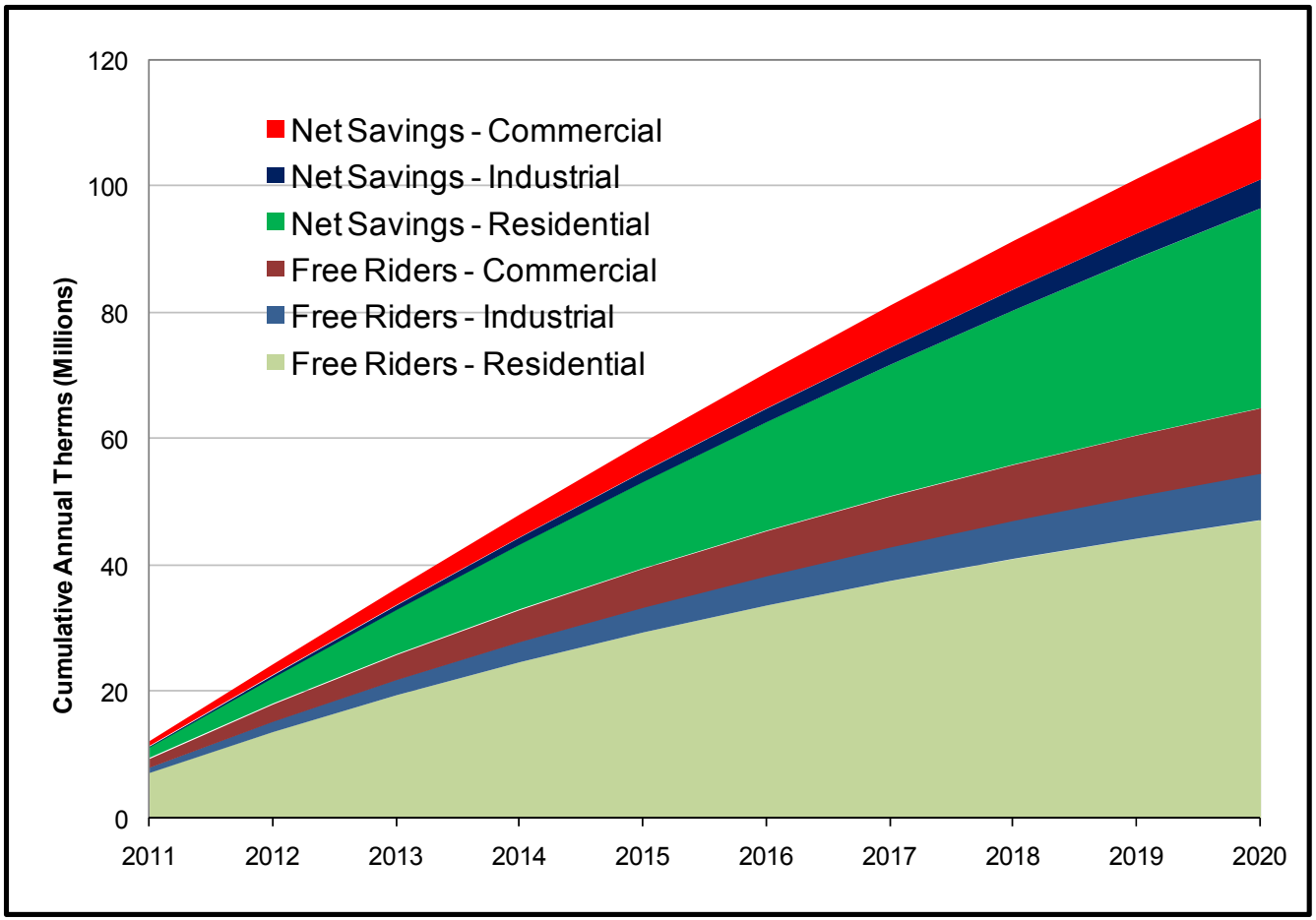


1 Year Payback Scenario Detail

Result - Programs	Program Scenario: 2011 - 2020			
	Residential	Commercial	Industrial	All Programs
Gross Energy Savings - Therms	1,179	465	204	1,848
Gross Peak Demand Savings - Therms/Day	12	6	1	19
Net Energy Savings - Therms	708	362	129	1,199
Net Peak Demand Savings - Therms/Day	8	5	0	13
Program Costs - Real, $ Million				
Administration	$61,422,380	$19,733,859	$5,750,461	$86,906,701
Marketing	$10,058,561	$17,251,421	$6,256,368	$33,566,349
Incentives	$220,499,718	$84,717,487	$14,406,378	$319,623,582
Total	$291,980,659	$121,702,767	$26,413,206	$440,096,632
PV Avoided Costs	$528,314,323	$267,909,908	$94,050,782	$890,275,013
PV Annual Program Costs (Adm/Mkt)	$57,884,996	$29,840,932	$9,598,933	$97,324,862
PV Net Measure Costs	$282,538,873	$95,971,969	$19,915,800	$398,426,642
Net Benefits	$187,890,454	$142,097,007	$64,536,050	$394,523,510
TRC Ratio	1.55	2.13	3.19	1.80

Note: Therms should be X 100000, e.g. “All Programs” Gross = 184 million therms

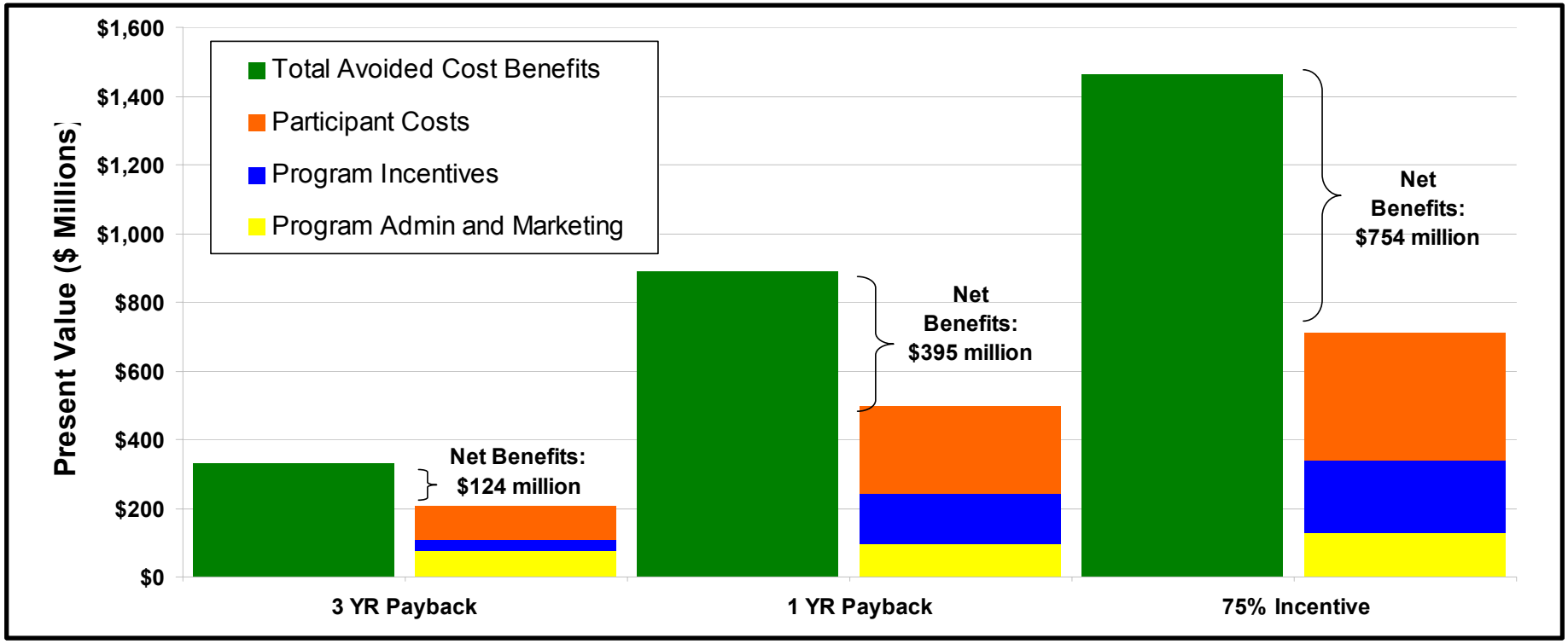
3 Year Payback Scenario
Gas Savings by Sector



3 Year Payback Scenario Detail

Result - Programs	Program Scenario: 2011 - 2020			
	Residential	Commercial	Industrial	All Programs
Gross Energy Savings - Therms (Millions)	78.78	19.99	11.99	110.77
Net Energy Savings - Therms (Millions)	31.64	9.64	4.55	45.83
Program Costs - Real, $				
Administration	$45,192,224	$14,185,888	$4,677,029	$64,055,141
Marketing	$10,058,561	$17,251,421	$6,256,368	$33,566,349
Incentives	$14,162,538	$12,142,215	$487,550	$26,792,303
Total	$69,413,323	$43,579,523	$11,420,947	$124,413,793
PV Avoided Costs	$228,427,479	$70,639,547	$32,040,920	$331,107,947
PV Annual Program Costs (Adm/Mkt)	$44,521,231	$25,365,719	$8,722,019	$78,608,969
PV Net Measure Costs	$101,105,423	$22,347,621	$5,303,396	$128,756,440
Net Benefits	$82,800,826	$22,926,206	$18,015,505	$123,742,537
TRC Ratio	1.57	1.48	2.28	1.60

Gas Benefit Cost Summary



Demand Response Potential

DR Approach

- Reviewed impacts from FERC's *2009 National Assessment of Demand Response Potential* as it applies to the State of Missouri
- Validated or adjusted as necessary, using data developed during the data collection phase of the project
  - Some key data elements review included:
    - Number of customer accounts by rate class
    - Electricity sales by rate class
    - System peak load forecast & average peak by rate class
    - Current penetration of demand response
- Model used for FERC assessment is publicly available and updated regularly

FERC National DR Study

- Bottom up approach using 4 customer segments: residential, small, medium, and large nonresidential
- Five DR program types
  - Direct load control,
  - Interruptible rates,
  - Dynamic pricing with enabling technologies,
  - Dynamic pricing without enabling technologies, and
  - Other DR programs (such as demand bidding).

KEMA

FERC National DR Study

- Results developed for four different DR scenarios:
  - Business-as-usual (BAU): current programs and tariffs are held constant;.
  - Expanded BAU (EBAU): BAU program participation rates are increased to equal the 75th percentile of ranked participation rates of similar programs.
  - Achievable Participation (AP): further assumes advanced metering infrastructure (AMI) is universally deployed, and dynamic pricing is the opt-out default tariff.
  - Full Participation (FP): similar to the AP scenario, except that dynamic pricing and the acceptance of enabling technology is mandatory. This scenario quantifies the maximum cost-effective DR potential, absent any regulatory and market barriers.

Scenario Assumptions

Assumption	Business-as-Usual	Expanded BAU	Achievable Participation	Full Participation
AMI deployment	Partial Deployment	Partial deployment	Full deployment	Full deployment
Dynamic pricing participation (of eligible)	Today's level	Voluntary (opt-in); 5%	Default (opt-out); 60% to 75%	Universal (mandatory); 100%
Eligible customers offered enabling tech	None	None	95%	100%
Eligible customers accepting enabling tech	None	None	60%	100%
Basis for non-pricing participation rate	Today's level	"Best practices" estimate	"Best practices" estimate	"Best practices" estimate

Model Results Summary

Year	System Peak (without DR)	Business As Usual	Expanded BAU	Achievable Participation	Full Participation
MW Reduction					
2010	18,102	17,820	17,414	17,414	17,414
2015	19,755	19,473	17,921	17,356	16,812
2020	21,495	21,213	19,595	18,513	17,443
2025	23,365	23,083	21,383	20,272	19,166
2030	25,398	25,116	23,328	22,188	21,045
Percentage Reduction					
2010	18,102	2%	2%	2%	2%
2015	19,755	1%	2%	12%	12%
2020	21,495	1%	9%	14%	19%
2025	23,365	1%	8%	13%	18%
2030	25,398	1%	8%	13%	17%

Benefit Cost Analysis

Customer Type	Dynamic Pricing with Enabling Technology	Direct Load Control
Residential	1.24	4.18
Small C&I	1.27	4.78
Medium C&I	3.41	4.78
Large C&I	2.21	Not Applicable

APPENDICES –

- Appendix A: Detailed Methodology and Model Description
- Appendix B: Measure Descriptions
- Appendix C: Economic Inputs
- Appendix D: Building and TOU Inputs
- Appendix E: Measure Input Data
- Appendix F: Technical and Economic Non-Additive Measure Level Results
- Appendix G: Supply Curve Data

KEMA

Next Steps

- The PSC will provide comments to KEMA by January 25.
- KEMA will review these comments and produce the final report by February 4.

Thank you for your participation.

KEMA Contact Information:

Fred Coito

1 (510) 891- 0446 x44117

fred.coito@kema.com

Tom Franks

1 (781) 418-5751

thomas.franks@kema.com